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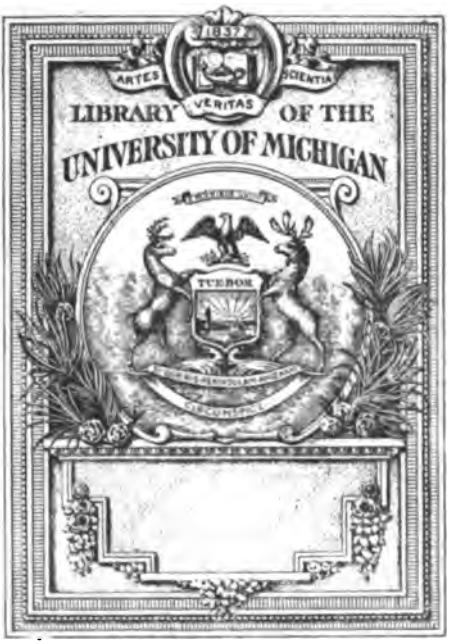

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FIFTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MINNESOTA.

JANUARY, 1876.

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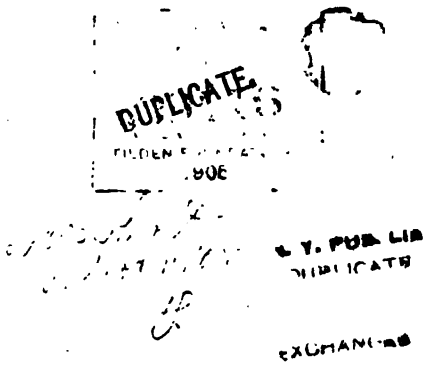

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OFFICE SECRETARY STATE BOARD OF HEALTH,
RED WING, January 30th, 1877.

To his Excellency John S. Pillsbury, Governor of Minnesota:

SIR:—I have the honor herewith to transmit the Report of the State Board of Health for 1876. Respectfully,

Your obedient servant,

CHARLES N. HEWITT,
Secretary State Board of Health

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MEMBERS STATE BOARD OF HEALTH.

D. W. HAND, M. D., St. Paul.
V. SMITH, M. D., Duluth.
CHARLES N. HEWITT, M. D., Red Wing.
FRANKLIN STAPLES, M. D., Winona.
W. H. LEONARD, M. D., Minneapolis.
E. J. DAVIS, M. D., Mankato.
CH. GRONVALD, M. D., Holden.

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GENERAL REPORT FOR 1876.

The State Board of Health and Vital Statistics respectfully report:

During the year past, there has been less epidemic prevalence of disease; less sickness, and less mortality than for several preceding years.

There is an increasing popular interest in sanitary matters. People are caring more for the purity of their water supply, the condition of their cellars, out-houses and drains, the warming and ventilation of their dwellings, as affecting the health of the family. It has been the constant aim of this Board to attract attention to the necessity for intelligent care of these matters by house-holders.

In the paper entitled "Infant Mortality; Its Causes; Their Modes of Operation, and the Means of Their Prevention," (Appendix A.) more evidence is drawn from the vital statistics of the last five years, and from medical experience, to show that our strongest hope for the diminution of this "slaughter of innocents" is the belief that more care will be taken in the future than the past to remove from our houses, disease causes, which without ceaseless vigilance harbor in and around them.

It is not the climate, nor the food, nor the clothing, now so commonly blamed for this mortality, that are really at fault. It is oftenest in impure house air that fatal poison comes to little ones. Parents have yet to learn that one of their most important duties is to know how to prevent sickness in the family.

To prevent disease rather than to wait its attack, before dealing with it, is the most valuable lesson taught by modern hygiene. Another of its lessons, and one which should be remembered, is that the feeblest attempt, faithfully and intelligently made, always receives adequate reward.

It is just cause for congratulation that the school authorities throughout the State are awakening to their duty in this respect,

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and are doing more to make the school house a means of health, as of scholastic education. This effort is most evident in the larger towns. While we have to report many expensive failures, we are glad to be able to report also more commendable successes.

The city of Winona, for example, is fortunate in their School Board. The two public school buildings, last erected by them, are a credit to the board, an honor to the city and the State. They are a long step in advance in school construction, and worthy of study by those whose duty it is to build such houses, and who desire to use the talent and best effort in this direction.

The great difficulty in school building is to harmonize sanitary and scholastic needs with architectural and mechanical work, to make the building pleasing to the eye; satisfactory as to cost; convenient for teachers and pupils, and with these to secure proper warmth and ventilation. The stumbling blocks have always been the two last.

We could fill a volume with descriptions of the expedients resorted to, even in costly buildings, to palliate defects in warming and ventilation, which are due to faulty original construction and are now nearly incurable.

We do not exaggerate, in reporting, that proper ventilation is rarely secured, and that satisfactory and economical heating is equally rare in the public schools of our large towns. As respects the common school houses, the concurrent testimony of superintendents and teachers is all in a like direction.

At the last meeting of the State Teachers' Association, the feeling found expression in the correspondence appended. (Appendix B.) As a result of that appeal, this board have ordered the preparation of a series of facts upon the hygiene of the common school.

The first of the series is attached to this report. (Appendix C.) It is an attempt to improve the warming and ventilation of existing school houses by the use of simple and inexpensive means.

The second paper of the series will discuss the best plan for new common school houses, and the methods of warming, ventilating, lighting and furnishing school rooms.

The secretary of the board will continue during the year the series of experiments with those for warming and ventilating begun in 1876. Valuable results have already been obtained, and the further inquiry will include the study of warming and ventilating apparatus for dwellings.

By instruction of this board, and at the request of the regents, the secretary has for the last three years served as Professor of Public Health at the University of the State. The subject of the

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course of lectures last spring before the Senior class was "Personal Hygiene." He has also, by our instruction, addressed the State Educational Association, and read them "A study of vital statistics of an average Minnesota population of 10,000 persons for an average year," which as giving in connected form a summary of the life of such a population, is worthy of study, and is reprinted. (Appendix D.) The secretary has also addressed other teachers' institutes and schools upon sanitary subjects, and availed himself of the columns of the newspaper press when opportunity occurred.

Up to the date of this report, Minnesota has escaped the epidemics of small-pox, scarlet fever and diphtheria, which are now prevailing in adjoining States.

Small-pox is reported epidemic in Wisconsin and Manitoba. We have been unable to get accurate reports from Manitoba, but from Wisconsin we are assured by a circular of the Wisconsin State Board of Health, that "the disease has appeared in many places in that State, and has continued to spread where it has found a foot-hold." Our people are in constant communication with the infected districts.

We have issued a circular calling attention to the danger and to the means of prevention. (Appendix E.)

Knowing the ignorance and prejudice of some portions of our population as to vaccination, and the carelessness of all classes as to its repeated use, we have offered to supply pure animal virus, taken directly from young heifers, at the cost price, removing in this way all opposition based upon the supposed danger of using humanized virus.

Since the publication of the circular, every call for this virus has been promptly met. Letters have come in from all parts of the State. In the majority of cases animal virus is used to get a new start for humanized virus, and great benefit will follow the adoption of this course by physicians.

There is so much popular indifference as to the use especially of re-vaccination, that we give a few facts of the history of small-pox before and since Dr. Jenner's discovery, which ought to be sufficient to demonstrate that vaccination is the only bar to an outbreak of this dreaded scourge, only second in severity to its work before vaccination, when it was the most loathsome and fatal of human disorders. (Appendix F.) We also publish directions for the prevention of contageous diseases, and for their management when they occur. (Appendix G.) Should small-pox appear in any locality, the duty of every citizen is very simple and plain.

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1st. To see that his own family, including himself, are protected by vaccination and re-vaccination, and then to help create a public opinion which shall compel the same precaution by every one else.

2nd. To insist that all cases of the disease be excluded from all possible intercourse with others, and that they have every comfort and attention which their condition requires. With our present facilities for dealing with small pox there is not any occasion for panic or alarm. Only let energy often paralyzed by fear, find vent in intelligent care and precaution, and all will be well.

THE INSPECTION OF THE PUBLIC INSTITUTIONS.

This report (Appendix "H,") is made up from the special reports of committees of this Board, who made special visits for the purpose.

Most of the defects in heating and ventilation in these institutions, to which we have called attention for several years, are caused by the faulty original construction of the buildings, so that our recommendations, and the efforts of the managers are of necessity palliative. The State Capitol is an example in point.

The only possible remedy must be for the future, and we respectfully ask that copies of all plans proposed for change in old buildings, as for new ones, be filed in our office, for examination and future reference, and that no such plan be adopted until it has been carefully studied with reference to its provisions for lighting, heating, ventilation, water supply, and other sanitary necessities. In this way we can save much unnecessary expense, and subsequent disappointment and trouble.

The State Inspector of Illuminating Oils reports the operation of the existing law as satisfactory. As this report goes to press there are renewed complaints as to the bad qualities of kerosene now furnished by some oil companies. We have not had time to investigate the matter, but if there seems reason therefor will do so, reporting the result.

Since our last annual report, Dr. A. E. Senkler, of St. Cloud has removed from the state, and therefore resigned his commission as a member of the Board. We take this opportunity to record our high appreciation of his scientific skill and accuracy, and of the great service which he did in organizing a system of meteorological reports as a department of our work. Ch. Gronvald, M. D., of Goodhue county was appointed his successor.

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E. J. Davis, M. D., of Mankato has been appointed to succeed Dr. G. D. Winch, who at the expiration of his term of service declined re-appointment. Drs. D. W. Hand, V. Smith, and C. N. Hewitt have been re-appointed, and Dr. C. N. Hewitt has been re-elected Secretary.

The financial statement, appended, will show the expenditure of the appropriation of one thousand dollars, made for the work of 1876. The sum of seventy-four dollars and twenty-five cents has been reserved as a contingent fund, traveling and other expenses.

D. W. HAND,
V. SMITH,
CHAS. N. HEWITT,
FRANKLIN STAPLES,
W. H. LEONARD,
E. J. DAVIS,
CH. GRONVALD,
Members State Board of Health.

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APPENDIX.

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A."

INFANT MORTALITY,

ITS CAUSES, THEIR MODES OF OPERATION, AND THE MEANS OF THEIR PREVENTION.

By THE SECRETARY.

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INFANT MORTALITY.

It is proposed in the following essay to present the testimony of the vital statistics of Minnesota as to the proportion and causes of infant mortality, and if possible to interest all, parents especially, in an effort to reduce the death rate of this class, which annually cuts off between 2,000 and 3,000 children under 5 years of age.

In the United States the average death rate under this age is 40.82 per cent. of total deaths. In Minnesota for the last five years it has been 45.70 per cent. In the agricultural districts it averages about 40 per cent., and in the large towns from 45 to 50 per cent.

The medical profession have repeatedly declared this proportion altogether too large, and popular opinion tends now in the same direction.

The mortality is charged upon our climate; upon the cold of winter and the heat of summer. There is believed to be something in our atmosphere too stimulating to the infant nervous system, which is supposed to account for the great number of deaths by convulsions, and for the assumed difficulty of passing through the natural process of teething, thought to be so fatal in the second summer of life.

There is a great lack of reliable facts, and great misapprehension of the charcter and operation of disease cause.

In the study of the vital statistics it will be found that many diseases preserve an almost constant ratio as death causes, and that the greatest disproportion is in the class of contagious diseases, whose rate of mortality is greatly affected by their epidemic character.

Of all deaths reported, one-quarter in the average are given without any specified cause.

Part of this omission is due to the carelessness of collectors; part to the fact that a considerable proportion of very young children die without medical attendance, and part to the real ignorance of the parents.

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Of the assigned causes of death, there is a considerable proportion not accurately given.

In 1875, for example nearly 10 per cent. of all deaths from consumption are reported as under 5 years of age. Convulsions, which are often the last stage, or a sequel of a variety of infantile diseases, are reported as the only cause, in a very large proportion.

Diphtheria is a favorite name for other kinds of throat affection than the dreaded disease, to which the name really belongs. Even the most skillful physicians find difficulty in assigning the real death cause in a few cases, so that it is not to be wondered at that parents, guided by most evident symptoms, or by preconceived notions, are frequently mistaken in their honest belief and report as to the cause of a child's death.

The importance of these facts here comes from the necessity of allowing them due weight in deciding upon the reliability of the vital statistics.

As respects the study of disease, with a view to prevention, it is apparent that if physicians or parents are ignorant of the real cause of the death of one child, they will be by so much, helpless in preventing the operation of the same cause upon others.

How few parents there are who are able (even if they believed it possible, and were inclined to do so,) to look for and find the causes of a little one's sickness or death, or who could use such knowledge with practical advantage. There are not so many as there should be who, when advised by their family physician, or other competent authority, set themselves intelligently to work, making such knowledge one of the common instrumentalities of their every day family life.

The vital statistics give only too convincing evidence of this popular neglect of sanitary knowledge. It is therefore the duty, and one of the most important of the duties of the State Board of Health to iterate and reiterate the story told in this article, and to bring it home as nearly as possible to every parent in the State.

Of the 6,057 children under 5 years of age who died during the years 1874–5, but 98 died from other causes than disease.

In 1874 the deaths of this class from accidents were as follows:

Burns and scalds	21,	of whom	14 girls.
Suffocation	8,	of whom	8 boys.
Drowning	9,	of whom	2 girls.
Not specified	13,	of whom	5 girls.

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The last item is an example of the gross carelessness of the collector of the statistics.

Classifying the deaths by disease in a popular way, we obtain the following percentage to total deaths in order of fatality:

Diseases of the bowels, 22.2 per cent.

Eruptive diseases, measles, scarlet fever, diphtheria, spotted fever, 18.6 per cent.

Diseases of brain and nervous system, 11.45 per cent.

Diseases of the lungs other than croup and consumption, 8.2 per cent.

Debility, chiefly in new-born child, 8.0 per cent.

Scrofulous diseases, including consumption and water on the brain, 4.8 per cent.

Croup, 4 per cent.

Whooping cough, 4 per cent.

Of diseases of the bowels, cholera infantum caused 14.2 per cent. of all deaths at this age, and over half of the class.

Diarrhœa and dysentery, 4 per cent. each of total mortality, and one-fifth of the class.

Of eruptive diseases, scarlet fever, 7 per cent. of all deaths, 43.3 per cent. of class. Diptheria, 7 per cent. of all deaths, 43.3 per cent. of class. Measles, 2 per cent. of all deaths, 8 per cent. of class. Spotted fever 2 per cent. of all deaths, 8 per cent. of class.

The diseases of this class generally prevail in epidemic form, over a considerable territory, attacking nearly all children exposed and unprotected by previous attack or by the healthful surrounding of their own homes.

The mortality from eruptive diseases is so great and so constant that they were among the first studied by sanitarians, with a view to their prevention. The conclusion of years of investigation and experiment is, that they all are preventable, almost as much so as small-pox—the most dreaded among them. It is also shown that even when life is spared, there is often irreparable damage done by their attack, *e. g.*, diseases of the kidneys after scarlet fever, and the development of glandular or scrofulous disease by measles.

Popular opinion has not yet come to this view of the fact, and these diseases are therefore looked upon as the inevitable incidents of childhood for which there is no prevention.

Of diseases of the brain and nervous system, convulsions are by far the most fatal. They are not properly classified as a special disorder, but are, as we have said, more often the sequel or latter stage of a variety of infantile diseases.

Of diseases of the lungs, inflammation of the lungs causes the

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greatest mortality. Bronchitis next. The difference between them is, so far as prevention is concerned, unimportant.

Debility, chiefly of the new-born child, includes a variety of causes. Such debility is very often the result of ill health, lack of proper food and clothing by the mother. The little one suffers from this cause before and after birth; the milk of the mother for the same reason lacking the quality and quantity necessary for the child's support.

The scrofulous diseases of infancy as of adults maintain an almost constant ratio for consecutive years. They are in our State at least, always hereditary, transmitted from parent to child. In infancy they assume the forms of dropsy of the brain, and intractable affections of the glands, joints or bowels. They are the least amenable to medical or sanitary control of all infantile diseases.

Croup also has a pretty constant ratio as a death cause, but its causation is still so obscure as to escape direct prevention.

Whooping-cough is a contageous affection for which, as for all contageous diseases, with the exception of small-pox, the means of prevention consists chiefly in the seclusion of the sick and the avoidance of exposure by the well.

Croup is a terror in the family and it is well that the fact should be popurlarly known that the spasmodic variety is the most frequent, and as a rule not very dangerous. It differs from the genuine croup by the absence of high fever, and of the membrane or exudation in the windpipe—medical aid should be obtained speedily in any case, but parents ought to become faliliar with the routine treatment of the disease, that valuable time may not be lost before the physician arrives.

The diseases now briefly described occasion probably 85 to 90 per cent. of our yearly infant mortality, and it is therfore of the greatest practical importance that parents should have some accurate knowledge of their causes, their origin, mode and season of attack, and so of the means of their prevention or diminution.

This done they may be sure that they can act intelligently and successfully in warding off from their little ones a large proportion of the danger from disease which now threatens them without successful opposition.

As to age at death during childhood, the following tables drawn from the statistics of 1873-74 give an answer which does not vary greatly from the average of years;

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Of deaths under one year—

26.2 per cent. are of children during 1 month.

6.7	"	"	"	"	2	months.
4.8	"	"	"	"	3	"
12.1	"	"	"	"	4	"
5.3	"	"	"	"	5	"
5.3	"	"	"	"	6	"
5.3	"	"	"	"	7	"
7.2	"	"	"	"	8	"
7.2	"	"	"	"	9	"
7.7	"	"	"	"	10	"
3.7	"	"	"	"	11	"
3.7	"	"	"	"	12	"

(Statistics of St. Paul, 1878.)

Of deaths under five years—

65.9 per cent. occur during 1st year of life.

18.0	"	"	"	2d	"	"
7	"	"	"	3d	"	"
5.6	"	"	"	4th	"	"

10.1 per cent. of deaths before sixth year occur in fifth year of life.

5.2 per cent. of deaths before eleventh year occur between fifth and eleventh year of life.

6.2 per cent. of deaths before sixteenth year occur between tenth and sixteenth year of life.

The greatest mortality under one year of age is during the first month, and the death rate during the first year is almost exactly two-thirds that of all deaths under five years. Very few will be prepared for the evidence of these tables. Still they may be accepted as very near the truth.

They emphasize the fact to which attention is now called, that the causes of infant mortality centre, and must be looked for and dealt with, in and about the house which is the children's home. It is their world, their life is spent almost exclusively there.

It will be seen how much depends upon the parents' appreciation of this fact, and upon their use of means of prevention in the effort to reduce the infant mortality of our State to its possible minimum, or at least to a proportion much less than is at present the fact.

Physicians and health boards are helpless, except during the prevalence of any serious epidemic where public safety permits them to compel the use, by families, of the means of preventing disease which sanitary science affords.

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AS TO THE SEASON OF GREATEST MORTALITY.

Of diseases of constant occurrence, affections of the bowels are the most fatal, and therefore the summer is the season of greatest mortality as a rule. Eruptive diseases, occurring chiefly in cold weather, when prevailing epidemically, are by far the most fatal of infant diseases.

Diseases of the air passages including croup and whooping-cough are most fatal in winter. For the years 1874-75 for example:

Diseases of warm weather	33.65
Diseases of cold weather	34.8
Diseases not so much affected by seasons (scrofulous and debility.)	12.8

With this statement of the cause, age and season of greatest mortality in childhood we go on to the study of the character and origin of the poisons to which diseases are due.

They are always organic in their nature, and since the historic period, at least they have had their origin in the bodies of persons suffering from them, and in a few cases in animals.

Every particle of those poisons has the power under favorable circumstances to develop in the human body the disease in which it originated.

Of the diseases so caused and therefore called infectious or contageous, small pox, measles, scarlet fever, diphtheria, typhoid fever, whooping cough, erysipelas, cholera and some forms of diarrhœa are familiar examples.

These poisons reach the human body in various ways. They travel in the air as moist or as dry solid particles, so minute as to defy detection or measurement. In this form they may be breathed and reach the blood through the lungs, or caught in the mouth or nasal passages, may be swallowed with the food. In whatever way they come, there must be actual contact to produce disease.

The probabilities are that the peculiar poison of measles, scarlet fever and whooping-cough, are inhaled in the air.

The virus of small-pox, diphtheria and erysipelas may be inhaled, but it is most often innoculated; that is, comes in contact with an abraded surface as does the virus of cow-pox in vaccination.

The poisons of typhoid fever, cholera, and some forms of diarrhœa, enter the body in food or drink and are swallowed.

Some of these diseases are not likely to occur the second time. This is the rule with small-pox, scarlet fever, measles and whoop-

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ing-cough, but most physicians of experience have seen the first three recur, so that in the case of small-pox, a previous attack should not be relied on to the exclusion of vaccination.

Sanitary research has determined that all these special poisons may be destroyed or rendered incapable of communicating disease.

1. By extreme dilution with water.
2. By exposure for some time to heat not less than 212° F.
3. By some chemical agents, as moist ozone, free chlorine, iodine, bromine, nitrous acid gas and sulphurous acid.
4. By prolonged exposure to pure air and sunlight.
5. By the action of dry earth (garden mould) when applicable.

The two last, the natural methods by which the great ocean of air is kept of an almost unvarying purity, are of the greatest possible importance in domestic use.

And now we are prepared to inquire, when and how these poisons originate or find lodgement around or in the house, which is the home.

Before going further, it is important to know something of their general operation. Only a few of them have been recognized, and those chiefly by their marked peculiar effect. But when we have taken out of the list of ailments, all those known and recognized as special diseases, there are left a very large list of little ailments, indisposition and difficulties in doing ordinary work,—many indefinable sensations and conditions which the French call Malaise, and for which we have no single word. Besides these, there is the chronic invalidism and ill health, constantly interfering with efficiency. Add to these the predisposition to the attack of the various special disease causes characteristic of many of those conditions, (often discovered only after the disease has gained a foothold,) and we find that we have a considerable proportion of the average of human misery. No actual, acute, and terminable disease; but little burdens, delays, and hinderances, which handicap the damage done to the work of a life by many acute disorders taken all together.

Very much of this disibility is directly due to organic poisoning. Children are, it is well to remember, the most susceptible to morbid influences of any of the family. So true is this that the acute sanitarian looking into the health status of a household, enquires first for the children, and judges very much from their home history and previous condition where to look for causes of sickness. The parent should be aware of this fact and if there is any falling off from the natural standard of health on their part, evidenced, not merely by sickness but by any of the symptoms

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described, languor, pallor, sleeplessness, restlessness, the sluggish performance of any natural process, physical or mental, he should set himself earnestly and carefully at work to discover the cause, and the first inquiry, except in special cases should be as to the purity and abundance of the house air.

Let us study for a moment the amount afforded and the usual impurities of this air.

First, With the best means at our disposal this air can never be made as pure and healthful as that out of doors, nor can we supply it with anything like the amount given in the open air—3,000 cubic feet per head per hour is as much as with the most perfect apparatus and constant attention, can be obtained in cold weather in the house, while out of doors in a gentle breeze more than 150,000 cubic feet pass over the person of a little child in an hour.

There is not a house in the State, there are very few anywhere, in which it can be exactly told how much fresh air is received per hour; and experiments show that the average supply in cool weather does not amount to 1,000 feet per head per hour.

Frequently our houses are so constructed that in cool weather fresh air comes in in all directions in spite of us; the difficulty and danger of such supply is that a draft of cold air is often for delicate little ones, as for many adults, a great danger, inducing those diseases of the lungs which stand high in order of mortality at their age.

The attention of parents is called to the article in this volume, "on the means of warming and ventilating common school houses," where they will find a popular statement of the principles of warming and ventilation, and their use in ordinary wooden buildings as applicable to the average dwelling as to the school house.

This, then, is the first danger. A supply of fresh cold air in draughts, inadequate in amount and not sufficiently warmed. The thermometer should, for this reason, be in constant use in the family. It will be found that in ordinary houses the temperature at the floor (on which the baby sits with its toys, and the other children play,) is below 50°, when at the height of four feet it may be 70°, and even more, and it is along the floor that the cooled currents of air pass. For this common evil see suggestions of the article referred to.

The ordinary carpet and the unpainted floor retain and give off to the air of rooms not only a great variety of offensive organic odors, but organic and inorganic particles which, with slight provocation, float in the air especially near the floor and are so

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breathed or swallowed by children. If it were the intention to compel the respiration of as much as possible of those odors and particles, no better way could be devised, for constant use, than the method now unconsciously used by parents in their houses. The furniture and wall papers aid in this direction; wall paper especially retaining animal affluvia, gaseous and solid, and accumulating them.

The means best adapted to prevent these evils are, well oiled floors, movable rugs instead of fixed carpets, and painted instead of papered walls, and with any arrangement the freest ventilation while cleaning rooms, that the loaded air may be replaced by the pure air of the outside.

The bed as a source of disease is almost ignored.

Little children should sleep on ticks filled with material which can be easily removed, cleaned or replaced. Coverlids or quilts should never be used but only blankets and sheets. The simple reason is that children perspire easily and freely and are liable to soil in other directions. Quilts are almost impervious to moisture. Blankets pass it freely and are easily cleansed by beating, airing or washing. The importance of caring for the purity of the bed and bed rooms will be apparent when it is remembered that more than half the child's time is spent in them, and that portion of their time too when the processes of growth and of excretion by skin and lungs are most active.

Another source of impurity to the house air is the addition of foul gases or solid matter from without. In cold weather chiefly, but in all weather to a considerable extent, the house acts as a chimney into which by the ascending warm air, other air from the cellar and surrounding soil is drawn.

In this way the effluvia of the cellar are diffused all over the house, but so slight is the fear of these matters that it is not at all uncommon for the furnace to take the air to be warmed for the house supply from the cellar alone.

It is not generally known that there is a soil air, as one above the soil which is easily contaminated by the effluvia of drains, out-houses, and cess pools, and that it is constantly going in and mingling with the house air through cellars. The poisons of bowel diseases and of typhoid fever pass into the drains and vaults of the houses in which the sick are. In this way a multitude of those disease particles gain access through the ground air to the house.

The remedy is perfect cleanliness and cement floors for cellars, and thorough independent ventilation. Great care for the recep-

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tion and destruction of all offensive discharges and of house sewerage generally, so that neither can gain access to the house air.

Look well to the water supply. The average well drains into itself the water from an inverted cone of soil 100 feet in diameter and of its own depth. It should be cemented thoroughly for twenty feet of its depth; covered, and cleaned at least yearly, and protected from all possible contamination from out-houses or drains. Popular tests for the purity of water are perfect clearness, absence of all odor, and a half teacupful put into a pint bottle, heated and shaken, should not give perceptible smell. In case of doubt, especially in warm weather, it can be easily filtered. Take a large flower pot of unglazed ware; stop the hole in its bottom loosely with a clean sponge; put in a layer two inches thick of coarsely powdered charcoal free from fine dust; put in that two inches of clean sharp sand; on that two inches more of fine gravel, and over that more sand; ordinary water slowly filtered through this will be fit to drink, but the filtering material should be frequently changed.

It has been proposed to substitute rain water for hard water as a drink for children. If pure, it is well enough; but the writer believes, with a considerable proportion of those who have studied the subject, that hard water is one of nature's foods for the supply of material for bone.

The fact that all natural water instinctively chosen by man for drink, contains mineral ingredients, points to the existence of a natural want other than mere thirst so supplied.

Next look to the food supply. For babies, till the eruption of the first teeth, there is no substitute for mother's milk; when some substitute must be found, the milk of a healthy cow before the cream rises is the best. It should be diluted with pure, warm water one half, and a little sugar added. The amount of water may be gradually decreased until the milk alone is taken.

Milk should be taken as slowly as is usual with the mother's milk, not so much at a time as often. If anything else is given, especially in hot weather, it should be toasted bread, or dry crust of bread softened in milk.

Parents should understand that up to a year of age, and possibly longer, the infant cannot digest starchy food. Baking, toasting, long boiling converts starch, more or less perfectly into grape sugar, which the little stomach can digest. This is the secret of the patent baby foods, and can be imitated very closely in well made thin toast or the crumbs of bread browned in the oven.

The food of children under five years in summer should be

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milk in various modes of preparation. Bread toasted or mealy steamed potatoes, fresh butter, and if meat is used it should be tender roast or broil; eggs, if fresh, soft boiled, or toast water, if pure and fresh may be allowed as wanted, if taken in small amounts at a time, and cool not cold. Things to be avoided—Tea, coffee, fried food, sweetmeats and the average of pastry. Fruits in their season, with other food, may be used with discretion. As to winter diet there is less danger of irritation of the bowels, and a greater variety, nearly corresponding to that of the rest of the family, may be permitted after the completion of the second year.

CLOTHING.

The great activity of lungs and skin in early life and the rapid consumption of force for growth leaving less for heat, render little ones very susceptible to changes of temperature. It is rarely advisable to do without thin soft flannel next the skin, especially of the trunk, even in summer. The same is true of the covering to the bed.

While removed from direct draught, the infant should have the greatest possible allowance of out door air in summer, both day and night, and as much of out door life and sunlight as can be given.

As to bathing the writer believes it best done at night, and that when not necessary for cleanliness, a little salt in pure soft water, is better than so much soap.

Thorough friction with the hand after the bath, and at any other time when tired or nervous, is very soothing to children. In winter, if with the friction a little pure animal oil is used, it will lessen the liability to colds. Over-exertion, bodily or mental, rarely happens with healthy children unless under unnatural stimulus. This should be carefully watched for, remembering that in our too-artificial life, it is more likely to have a mental or nervous cause, than to be due to physical exhaustion. For much of this excitement, regular physical exercise is the natural preventative. It should take the form of out door sports at all seasons of the year, with children over five years of age.

Physical education should go hand in hand with the mental and moral. It has the advantage of the others, that it can be obtained in greatest perfection without conscious labor. To this end, coasting, skating, sleighing, snow-balling, and other winter sports, are pleasant and efficient means.

In summer, the range of out-door sports, from mud pies to

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natural history, from the swing to the horse, from the race to the more formal dance, and from the bath-tub to the river, afford the most healthful and delightful variety.

With little ones, the key-note of management is, never to permit a decline of the average of health without earnest and intelligent effort to get at and remove the cause.

"Prevent sickness—don't wait to cure it," ought to be inscribed over every nursery in the land; and the means are such as hygiene (which is simply sanitary common sense) puts within the reach of every one.

No one is asked to believe that every child can be brought to puberty in health; but any one is very foolish, and, if a parent, guilty of inexcusable neglect, who does not believe that the percentage of infantile ill-health, sickness and death can, by simple sanitary precautions, be reduced to much smaller proportions than at present.

To accomplish the most in this work, (of which the value will be most keenly appreciated by those who have themselves lost little ones,) parents must be the principal workers, and every home the centre of intelligent thought and effort.

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APPENDIX "B."

RED WING, October 7th, 1876.

Hon. David Burt, Supt. Pub. Inst., Minn.:

DEAR SIR: At the last annual session of the Minnesota State Teachers' Association, the undersigned were appointed a committee to address a letter to the State Superintendent of Public Instruction, requesting him in the name of the teachers of the state to ask the State Board of Health to prepare and put in circulation, through the educational department of the state, a series of tracts on hygiene of the school-room.

Yours truly,

H. B. WILSON,
J. W. HANCOCK,
O. WHITMAN,
Committee.

STATE OF MINNESOTA,
DEPARTMENT OF PUBLIC INSTRUCTION,
ST. PAUL, Oct. 9, 1876.

C. N. Hewitt, M. D., Secretary of the State Board of Health:

SIR: At the last meeting of our State Teachers' Association, Hon. H. B. Wilson, Supt J. W. Hancock and Prof. O. Whitman were appointed a committee to instruct the Superintendent of Public Instruction to ask our State Board of Health to issue for distribution through his office, a series of tracts, the design of which shall be the improvement of the sanitary condition of our schools. It is with great pleasure that I communicate this request. Such an effort is much needed.

Permit me to suggest that you discuss in unscientific, plain terms, such topics as follows:

The causes of impure air in school-rooms.

The rapidity with which air becomes impure.

The effect of such air upon health and mental operations.

Methods of heating and ventilation in the construction of new school houses.

How stoves should be arranged in houses already built.

Expedients for ventilation in school rooms where no provision was made in their original construction.

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How seats should be arranged to secure health and comfort especially for small children.

The arrangement of windows with reference to a supply of light, neither excessive nor deficient.

Proper positions in sitting and standing, with special reference to the lungs and the preservation of the eyes.

Means of securing pure water for use in the schools.

Sanitary and moral importance of out houses, kept in good condition.

The necessity of suitable play grounds, and in buildings for graded schools, of a room for exercise in winter and in stormy weather.

With specific matters like these, your wisdom and experience will enable you to combine such general facts of physiology as you may deem important to the hygiene of the school room and of the family.

Herewith I send you some data concerning the number and condition of our *school houses*. If you desire anything further, you can propose a series of questions, and I will distribute them and obtain such answers from teachers as I can. If you can proceed on the data given, and your general knowledge of the subject, it may hasten the desired work.

I pledge you, sir, that whatever articles you may furnish, and send to his office, shall be thoroughly distributed, through our county superintendents of schools, into every district of the state.

If you respond favorably, I will advertise the matter by inserting this correspondence in my forthcoming annual report.

Very respectfully yours,

D. BURT,
Supt. Pub. Inst.

MINNESOTA STATE BOARD OF HEALTH,
SECRETARY'S OFFICE,
RED WING, MINN., Oct. 19, 1876.

To Hon. D. Burt, Supt. Public Instruction, St. Paul:

SIR: I am in receipt of your letter of the 9th inst., communicating "the request of the State Teachers' Association that the State Board of Health issue for distribution, through the office of the State Superintendent of Public Instruction, a series of tracts, the design of which shall be the improvement of the sanitary condition of our schools."

I am instructed by the State Board of Health to acknowledge the receipt of your letter, and to express their satisfaction that the necessity for such work has received a clear and practical expression by the Association and in your communication.

The Board assumes with pleasure the duty of preparing such tracts.

In view of the nearness of the winter, the Board direct that the first paper discuss the means best adapted to secure proper ventilation and warming in the common school buildings already in use, with a brief statement of the principles involved. The time is so brief that we have determined to base

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the paper upon such a statement of the existing facts, as we derive from the data in your office; from yourself, your predecessor in office, Hon. H. B Wilson, and such others as we are able to consult. The details of further papers will include the subjects you propose, and such others as experience or study may suggest.

I am, very respectfully, yours,

CHARLES N. HEWITT,
Secretary State Board of Health.

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"C."

THE PRINCIPLES

INVOLVED IN THE HEATING AND VENTILATION OF EXISTING COMMON SCHOOL HOUSES WITH SUGGESTIONS FOR THEIR PRACTICAL APPLICATION.

BY

CHARLES N. HEWETT A. M., M. D. SECRETARY MINN. STATE BOARD OF HEALTH, PROF. PUBLIC HEALTH UNIVERSITY OF MINNESOTA, ETC.

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PREFACE.

The following essay is the first of a series to be prepared under the instructions of the State Board of Health, by request of the State Superintendent of Public Instruction. When published, these essays will be distributed by that officer.

Their object is to furnish to School Boards and Teachers a statement of the principles and processes involved in the effort, now becoming more general and earnest, to make the common schools of the State in construction and arrangement all that they should be as provision for the health and comfort of teachers and scholars.

Much has been attempted in this direction, for the schools of our cities and larger towns, but scarcely anything for the common school.

Whatever the reason for this neglect in the past, there is now no longer any excuse for the condition of the great majority of these schools as reported by the State and County Superintendents.

At least 80 in 100 of our children receive no other scholastic training or advantage than the common schools of their neighborhood afford. For them this school is High School, College and University. If the necessarily limited educational facilities of the common school are of the real value we claim for them, they should be given under the most favorable conditions possible.

For the school, the school house is the body; it is the home; providing shelter, warmth, air, light, and apparatus essential to its proper work.

In proportion then to the high standard of that work, will be the call for and use of these means by school teachers. And in proportion to their appreciation of the schools' need, will be the supply of them by school boards, and the demand for them by parents.

The correspondence which gave occasion to this essay (Appendix to general report,) states very clearly the need felt by the teachers of the State, and one of the methods they propose for relief.

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The present essay will discuss the methods of warming and ventilation the existing common school houses in cool and cold weather. It will, of course, be understood that the suggestions of the paper must be palliative rather than remedial, because the defects in question are, as a rule, the result of faults in the original plan, so that remedy would be likely to involve almost a reconstruction.

It has also been thought best to confine the proposed arrangement to the use of existing stoves, drums, &c., with the least possible expense and trouble in the necessary changes.

The writer is therefore restricted to somewhat narrow limits, still the same principles are involved in every reasonable plan, and he hopes to be able to state them in such a way as to give the essay value over and above the partial and tentative suggestions which the special topic permits.

The description of the average school house furnished by the State Superintendent, will be taken as the one for which warming and ventilation are proposed; but should there be any special building for which advice is desired, the writer will give it, if a plan and description are submitted, with a statement of the defects to be treated.

Red Wing, January 25th, 1877.

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ESSAY.

There are a few definitions and general principles which must be recognized before any plan for the ventilation and warming of school houses can be made successful.

By warming, we mean the obtaining and maintaining of an average temperature of 63° F. of all the air in the school room or to be admitted into it. This implies that the temperature at the ceiling should not exceed 80° F., nor at the floor fall below 54° F., and the average of the whole air should not fall below 60° F., nor exceed 70° F.

By ventilation is meant such a change in the room air, (addition of fresh warmed air and removal of foul air,) as shall prevent a greater proportion of carbonic acid than one part in one thousand. In other words, such introduction of warmed fresh air and removal of foul warm air as shall keep the average purity of the room air above the point of danger to health.

It has been suggested that the writer state here what are the dangers to scholars from a lack of proper ventilation.

The effect of respiration upon a room air is to diminish the amount of oxygen and to increase the amount of carbonic acid. The amount of the last exhaled by the adult averages .6 of a cubic foot per hour, equal to 160 grains of pure carbon.

In the act of respiration, organic matter, in a state of active decay, is exhaled, suspended in watery vapors. The amount is not accurately determined, but it is sufficient to render the air of close rooms speedily offensive to the sense of smell. From one ounce to one and a half ounces of water are given off hourly in the same way by the lungs and skin, this amount of water requiring about 210 cubic feet of air per hour to keep it in the state of vapor. Organic matter is also added, in considerable amount, by the perspiration of the skin.

This organic matter, constantly given to the air from the lungs and the skin, is the most offensive and dangerous impurity from these sources. It is destroyed very slowly, and attaches itself to clothing, floors, furniture, walls, and windows, from which it is

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removed with difficulty. Its peculiar odor is always present in ill-ventilated bed-rooms, and is rarely absent from the ordinary school room.

In disease this organic matter from the lungs and skin is the carrier of specific poisons. Small pox, scarlet fever, measles, and other diseases are spread, by contagion, by this means. The amount of this matter bears a constant relation to the amount of carbonic acid in the air. This last is easy of detection and it is found that when it exists, in room air, in greater proportion than seven parts in ten thousand, the organic matter exhaled with it is offensive to the smell, and even from healthy bodies, is to be avoided.

The air of occupied rooms is also made offensive and harmful by organic matter brought from without in the clothing or on the person. The writer has recognized the odor of excrement in the air of a school room which, upon inquiry, was found to have been brought from a filthy outhouse on the shoes of the children, and it is a common experience of teachers to recognize the stuffy odor of ill-ventilated dwellings, or the flavor of articles of food, in the air of the school room, brought in this way by the children from home. Another source of impurity is the dust constantly floating in the room air, stirred up by the movements or work of the occupants. In this way organic and inorganic matters, in great variety, gain access to the mouth, throat, lungs and stomach, in the act of inspiration. An examination of the dust accumulated upon a single dish during one session of school, will surprise one by the amount and variety of ingredients found. The loss of oxygen and the addition of carbonic acid gas to the air of school rooms are proven by the listlessness and incapacity for study exhibited by the children. The standard of 1,000 cubic feet of fresh warmed air per head per hour as the minimum necessary for the ventilation of school rooms is the result of a long series of experiments upon inhabited rooms. Three thousand cubic feet would be far better, but that is impossible in winter or cool weather, in any common school yet examined. It should not be forgotten that with our best efforts the air of inhabited rooms is only comparatively pure. It can never attain the purity of the outdoor air, nor be supplied in anything but a fraction of its amount. Here is the evidence.

The average movement of the out door air in our climate is about seven miles an hour; an average man exposes a surface say 6 feet by $1\frac{1}{2}$=9 square feet to its action. Multiply that surface by the velocity and you have 90 feet a second, 5,400 feet a minute,

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324,000 feet an hour, of pure fresh air moving over the body of one person, standing out of doors, in the most moderate of breezes.

Another reason for demanding abundance of pure air in inhabited places, will, perhaps, be better appreciated if stated in the following manner:

Every adult inhales and exhales in 24 hours an average of 360 cubic feet or 2,000 gallons of air. In the same time he eats and drinks an average of 5½ pints of solid and liquid food—but the 3000th part in volume of the air breathed.

In weight, the food and drink rarely exceed six pounds; the air weighs 25 pounds—more than four times as much. Even common experience teaches that the air of the best ventilated rooms is full of floating particles, which of necessity are constantly entering with the air into the nose and mouth and beyond.

Now if we are so careful as to the purity of food and drink, because, as we know, the minutest particle of cheese poison for example, may induce in a healthy man the most distressing symptoms of cholera, if swallowed, why not be just as careful of the air we breathe, when we know that the poisons of many active diseases get access to the body in this way, and that it is not impossible but probable that slow poisoning may occur in the same manner?

Pure air is certainly as important a provision for children, as light, heat or food, for air is as truly food as bread or meat. The demand for it is never ending, never satisfied.

It is often asked. How is a teacher to know when the air of the school room is below the limit of permissible impurity? A cultivated nose is rarely deceived, and as a rule is a safe guide. For chemical certainty Dr. Angus Smith's method is the simplest.

The apparatus necessary for this test is:

I. A bottle of lime water, easily made by dissolving quick lime in water, adding an excess of lime. The clear solution is used for the test.

II. A wide mouthed bottle, (with a ground glass stopper,) which holds 6½ ounces by measure. Mark upon the bottle the space occupied by a half ounce of water.

III. A glass or rubber tube.

To test the air: exhaust the air from the bottle in the air to be tested by drawing it into the lungs through the tube, the bottle then will contain room air. Add a half ounce of the lime water and put in the stopper. If upon shaking the bottle the lime water remains clear the carbonic acid in the air tested does not exceed one part in 1,000. If the lime water becomes milky, the

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carbonic acid in the air exceeds the one part in 1,000. and the ventilation of the room should be increased.

As this article discusses warming with ventilation, and both for the cooler parts of the year, teachers are urged to refer constantly to the thermometer in caring for the warmth of the school room. Its use is absolutely necessary if one would do accurate work. Perfect and tested thermometers can be procured of Prof. Peckham, of the State University, for one dollar and a half. Such are the only ones to be relied on.

Warming is accomplished by the stove in two ways, by radiation and conduction. The first, diminishing as the square of the distance, was the method of the old fire place. It is not used in school houses because of the disproportion between its heating power and its cost. The second must be the principal source of power for the school stove. It operates by virtue of the physical fact that warmed air, being lighter, rises, and is replaced, from below, by cooler air.

By the use of conduction, the room air is made the carrier of heat to the walls, furniture, floor, and to persons, and is compelled to return to the source of heat for a fresh supply.

Radiation assists in this work, but conduction does by far the greater share, unless, as is attempted with fair success in the stove called "The Fire on the Hearth," we combine the principles of the furnace and the fire-place in one stove.

The school house proposed for our study contains but one room, 20 by 24 by 8 feet. The floor space covers 480 superficial feet, and the cubic contents of the room are 3,840 cubic feet, which is also the amount of the room air.

In this room is the school, consisting of twenty-five to thirty persons, pupils and teacher.

The building is of wood, clapboarded on the outside, lathed and plastered inside. The floor is single. The door is in one end and the chimney, with a flue 4x8 inches, comes down, inside the rear wall, three feet into the room. There are four ordinary windows—two on a side—having two sash of six panes of glass each. The workmanship of the building is ordinary, the under-pinning is of loose stones. There is no wind break of trees or of fencing. The stove is an ordinary box three feet long by eighteen inches square, and is surmounted, ordinarily, by a horizontal drum of sheet-irom and the pipe is six inches in diameter. The problem before us is: How to supply this school in this house with ventilation and warmth according to the terms of our definitions, whatever the temperature of the external air and the force of the

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wind. It is evident that our ability to do this depends upon several things.

I. The temperature and movement of the outside air.

In the cold season, (with which we are now concerned,) the point varies from —30° F. to 40° F. above a difference in extremes of 70° F. The latter averages at least 10 miles au hour.

II. The amount of fresh air required for the school.

This we have determined must be at least 1,000 cubic feet per head per hour upon 25,000 to 80,000 cubic feet in all.

III. The temperature to be maintained in the room air and its equable distribution.

An average of 63° F. in all.

IV. The construction of the building.

In the case before us this is faulty, and there are no special provisions for ventilation or for protection against extreme cold or high winds. No double windows or double floors, no storm house, hall, or wind break.

V. The size, make and creation of the stove, pipe and chimney.

The real difficulty against which we have to contend is the very great average difference between the required temperature in the school room and the existing temperature and degree of movement of the outside air.

The fact is that, in the building under consideration, there is no lack of fresh air supply, it comes in under and around the door and windows ; through the floor and through the very walls themselves, in quantity almost sufficient to supply the demand we propose to make upon it, but in such a way as to defeat the very object for which the house was built, the stove put in, and the fire maintained. Take a common example: The air outside—10° F. and moving 12 miles an hour.

The stove is red hot; actual experiment has proven the heat directly above it to be between 300°F. and 400°F.; at the ceiling, 120°F.; at the height of the pupils heads in centre of room, between 60° and 70°F.; at the floor, 32° to 40°F., rarely higher. The hottest place is just over stove and close to the ceiling, where the heat without circulation is useless. Next in temperature is the space within 6 feet of the stove. The coolest places are the northwest corner or wall, and that farthest from the stove. Pupils are constantly asking to go to the fire to warm feet or hands.

Does any one doubt that if no other air than that already there (3,840, cubic feet,) could get into the room, the fire is sufficient, after a short time, to raise the temperature to an unendurable degree? It could not do so at once, as the walls, windows, floor

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and furniture chill it. In so doing, they abstract the heat for themselves and have to be brought near to the standard of temperature before the room air will retain that degree of heat for any length of time.

But this is not the difficulty with our school houses, as we have seen. Here the cold air comes in so freely through and under everything except only the glass, that before it can be mixed with the room air, it presses it up to and out of the ceiling into the attic, and even through the roof, as witness the absence of snow on the leeward side, when it is present everywhere else.

What we must have, then, is a steady and sufficient supply of heat, a regular circulation of room air, and only sufficient incoming outside air through proper channels.

It is very evident that this cannot be perfectly done in the described building; but it can be done very much better than is common at present, with the same stove, no more fuel, and with very little additional expense or trouble. The principal necessity is the intelligent appreciation and co-operation of the teacher. Brains are a very indispensible element, even in so apparently simple a matter as this.

The first step is to locate the stove in the coldest corner, which is generally the northwest. The next is, to make the most of its heating power. This is now attempted with the horizontal drum; but it works chiefly by radiation, and that into the layer of air just above and around the pupils' heads, three or four feet from the floor.

The best use of the drum is, (properly arranged,) to promote by conduction, the circulation of the air as a carrier of heat to all parts of the room. The horizontal position prevents its doing much in this way. It should be perpendicular, as thus offering the least resistance to the rise of the heated air through its interior and along its outside.

Let any one try the experiment with a bit of burning paper or cloth, and he will prove for himself the feeble circulation through the horizontal drum, and its rapidity when the drum is perpendicular. The drum should not be placed over the stove. It obstructs the circulation of the air around the stove, and gains nothing in its own work. It should be just above the top of and behind the stove, its lower pipe-hole connected with the stove by a single elbow, its upper pipe-hole should join the main pipe by two elbows, with a length of pipe between them, so that the horizontal pipe shall not be too near the hot air opening through the center of the drum.

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Support the drum in this position by rods from the floor, and extend its hot air chamber, by a sheet-iron pipe of the same diameter, to within eight inches of the floor.

The drum should, if possible, stand in front of, or near the window nearest the northwest corner of the room.

The length of pipe entering the chimney should be made a T joint, the middle arm hanging down. To this arm, join a length of pipe in which is a snug damper, and, by additional lengths, extend the pipe to within six inches of the floor next the chimney. This is the foul air duct.

Cut a piece of inch board eight inches wide and the length of the bottom of the window sash. Raise the lower sash of the window behind the drum, and put the board beneath it, and shut the sash upon it. There is then left a space between the upper and lower sash, an inch or more in depth and the width of the glass, through which the outside air can and will come into the room. This is our fresh air duct. By the smoking paper it will be found that the air so entering ascends by a curve towards the ceiling. Now, to use this arrangement, remove the board and close the window, shut the damper in the foul air pipe, and light the fire. When the fire is burning briskly, the smoking paper will show a brisk draft from the floor, through the inside and along the outside of the drum, to the ceiling, where the heat begins to diminish, and the cooled air descends, losing more and more heat, till at the floor it flows towards the stove, to receive and begin the distribution of more heat. If the windows and doors are made as snug as possible, and the building banked up to the floor level outside, the fire kindled two hours before school ought to give the desired temperature to all the room air. If so, then, one-half hour after the school begins, open the window, put in the board, and open the damper in the foul air duct as much as can be done without stopping the draft of the stove.

It will be found that the fresh cold air is rapidly mixed with and warmed by the heated room air at the ceiling, and hastening its distribution; that about an equal current of the air at the floor level is discharging into the chimney through the foul air duct, and the remainder is moving along the floor towards the stove.

An advantage of this arrangement is, that the outside air, gaining free access through the window, will not come in so much through cracks and crevices.

By this very simple plan, freedom from drafts of cold air, supply of fresh warmed air, distribution of heat equally through the room,

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and removal of foul air, will be secured to an extent which will amply repay, in increased comfort, for the trifling expense and care which it demands.

Another plan to increase conduction, which the writer has tried with good results, is to surround three sides of the stove with a sheet-iron envelope, open at the top and bottom, supported on legs six inches from the floor, and four inches from the sides of the stove, and drawn in a little at the top, so that the upper edge overhangs the top of the stove.

The effect of this envelope is, that, by refraction, it retains a portion of the radiant heat of the sides of the stove, adding it to the current of ascending air passing between the envelope and the stove towards the ceiling. Not all the radiant heat of the stove is in this way lost to the room air and the stove, but enough is retained, acting on the principle of the furnace, to distribute the heat over a much greater space than the stove alone could do. This envelope can be used in addition to the drum as proposed, with advantage both for economy and for heat.

In any arrangement of heating apparatus, the stove draft should be regulated by its own damper, and not by one between the stove and chimney.

The heat passing into the chimney in the smoke, is all utilized in exhausting foul air through the foul air shaft.

The thoughtful reader who has caught the ideas and principles suggested in this essay, will readily understand that there are other plans than those here proposed, by which existing heating apparatus can be made to do better work; but these have been tried with success, and have the advantages of simplicity, economy and reasonable efficiency.

It is to be hoped that both school boards and teachers, will come to the conclusion that it is better to build with direct reference to these essential things than to waste time, money and patience in efforts which, though fairly successful, are only palliative of defects that ought never to have existed at all.

The attention of such is called to the next essay of this series, Its subjects will be—

"How to build and equip common school houses in Minnesota so as to secure the best ventilation, warming, lighting, arrangement, and furniture, with the greatest economy of means and with the minimum of expense for subsequent maintenance."

All the most recent contributions to the literature of the sub-

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ject, and the series of experiments now in progress by the writer upon a variety of heating and ventilating apparatus, will be put under contribution to make that paper as clear and practical as possible.

Red Wing, Minn., Jan. 20, 1877.

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"D."

A STUDY OF THE VITAL STATISTICS

OF AN AVERAGE MINNESOTA POPULATION OF 10,000 PERSONS, FOR AN AVERAGE YEAR. READ BEFORE THE MINNESOTA STATE EDUCATIONAL ASSOCIATION

BY

CHARLES N. HEWITT, A. M., M. D., SECRETARY MINNESOTA STATE BOARD OF HEALTH.

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REPORT.

Taking an average population of 10,000 people in Minnesota, having partly a village and country residence, their vital statistics, for an average year, would be as follows:

Births during the year	395
Marriages during the year	85
Deaths during the year	105

As respects age at the middle of the year, the population will stand about as follows:

Children under 1 year of age	317
Children under 5 years of age	1,614
Persons under 21 years of age	5,400
Persons between 5 and 21 years of age	3,789
Persons under 20 years of age	5,205
Persons under 70 years of age	9,900
Persons over 70 years of age	100
Families (estimated as averaging 5 persons)	2,000

Of the Dead:

25	per cent.	under	1	year of age	=	8	per cent.	of the population	of that age.	
15	"	"	5	"		3	"	"	"	"
63	"	"	20	"		1.2	"	"	"	"
32	"	betw. 20 and	70	"		.6	"	"	"	"
5	"	over	70	"		5.5	"	"	"	"

The average death rate of the whole population is estimated as that of the State for 1872, 10.3 per 1,000, or 1.03 per cent. This is too low, and would be about 15.0 per 1,000, or 1.5 per cent., if the returns were complete.

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In St. Paul, 1872, it was 23.7 per 1,000, or 2.37 per cent.
Under 1 year of age, 29.5 per cent. of total deaths.
Under 5 years of age, 53.7 per cent. of total deaths.

In London, the average annual death rate was estimated, in 1870, at 25.0 per 1,000, or 2.5 per cent.

In New York, it averages about 30 per 1,000, or 3.0 per cent. Children under 5 years of age, 50 per cent. of total deaths.

EXPECTATION OF LIFE (U. S. CENSUS OF 1870.)

At	1	year of age,	39.2	Death at	39.2 years.
"	10	years of age,	33.3	"	53.3 "
"	20	"	38.2	"	58.2 "
"	30	"	32.5	"	62.5 "
"	40	"	22.4	"	66.4 "
"	50	"	20.4	"	70.4 "
"	60	"	14 7	"	74.7 "
"	70	"	9.8	"	79 8 "
"	80	"	6.0	"	86.0 "
"	90	"	3.4	"	93.4 "
"	95	"	2.5	"	97.5 "

As for individuals, so for communities or states, there are, as respects efficiency in any department of work, three stages of life.

I. THE STAGE OF DEVELOPMENT. From birth to 20 years of age.

II. THE STAGE OF EFFICIENCY, THE SUSTAINING PERIOD. From 20 years to 70 years of age.

III. THE STAGE OF OLD AGE. From 70 years to death.

The second stage includes the workers—upon whose efforts the labor of the world depends.

The first and third classes include the dependents, those who are sustained by the second class. One test, therefore, of the capacity of individuals and peoples is the number of years spent in this stage of life—between 20 and 70 years of age.

In our representative population, it will be found that—

5,205 or 52 per cent. are of the first class.
100 or 1 per cent. are of the third class.

5,305 or 53 per cent.

of the population are included in the dependent class, so that there are left but 4,695, or 47 per cent., effectives. The work of

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this class is to sustain themselves during the working period, to sustain the dependent class during this period; to provide for the support of themselves during old age. The proportion of the sustaining class to the dependent class in the United States, in 1870, was as 49.02 to 50.98.

Not all who enter upon the sustaining period of life, live to complete it. The average life after 20 years is but 38.2 years, death occurring during the 58th year, 12 years short of 70 years, so that the loss of effective power during this stage is 25 per cent. In England, this average is 25.82, or death at 45.80 years of age.

The period of greatest loss of life is that of growth.

15.5 per cent. of children will die before completing the first year.
85 " " " " " 20th "
79 " " " " " 70th "

So that but 21 in a hundred reach old age, and but 9.5 per cent. attain 80 years.

This proportion is sufficient, when the circumstances of its occurrence are considered, to justify the proposition made by sanitarians, that 80 years be taken as the practicable standard of age for civilized men. Not all can hope to attain it, but a constantly increasing proportion may do it. In a population of 10,000 people who should do so, none would die before twenty, and all would survive the 70th year. The proportion of the dependent and sustaining classes would be as follows:

2,500 under 20 years of age.
1,250 under 70 years of age.

3,750, dependent class.
6,250, supporting class

The labor of six years and three months supports ten years of life. The actual fact is, that we now have but 4.5 years in which to support ten years of life.

But these statistics do not tell the whole truth. They only indicate the average years lived by the sustaining class, not their capacity for, nor the time spent in, sustaining labor. To discover that, we must know the time and efficiency lost or impaired by sickness or other cause.

The probabilities deduced from the experience of Health Assurance Companies in the United States and abroad, and from the American vital statistics, are as follows:

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Acute Sickness.—For every death allow 730 days of sickness, equal to two persons sick all the time for every death, per annum.

In our population of 10,000, there will be, during the year, 76,650 days of totally disabling sickness, giving an average of seven days, or one week, for every individual of the population.

Disability from other cause than acute sickness.—It is demonstrable that there is a further disability for work by reason of chronic ill-health, deformities, little ailments, malaria, etc., equivalent to at least as much more time, so that from all causes we may safely assume 14 days disability per capitem, per annum, in our population.

Our effective force equals 4,700 persons having an average working life of 38 years, but loosing in that time 1.46 years by inability to work, making the probable effective life but 36.54 years.

The average loss in Europe is 19 to 20 days per capitem per annum.

Ratio of constant sickness.—In our population there will be at least 200 persons constantly sick, 20 cases of sickness occur for every death, giving an average of one case of acute disease in 10 families, or one in 50 of the population.

The distribution of sickness or disability is not, of course, equal.

An English authority gives the following table for England which is rather better than the American average. It represents persons in fair, average health.

EXPECTATION OF SICKNESS.

At	20	years	of	age,	expect	4	days	yearly.
"	20-30	"	"	"	"	5-6	"	"
"	45	"	"	"	"	7	"	"
"	50	"	"	"	"	9-10	"	"
"	55	"	"	"	"	12-13	"	"
"	60	"	"	"	"	16	"	"
"	65	"	"	"	"	31	"	"
"	70	"	"	"	"	74	"	"

Causes of Death and Sickness.—In our supposed population of 10,000 persons, at least 105 will die yearly—*i. e.*, 10.5 per 1,000, or 1.05 per cent.

36 will die of what are classed as zymotic diseases. These in order of mortality will be:

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Typhoid Fever.
Cholera Infantum.
Diarrhœa and Dysentery.
Whooping Cough.
Croup and Diphtheria.
Rheumatism.
Remittent fever and ague.
Erysipelas.

18 will die of some local disease, in order of mortality:

Inflamation of Lungs, and Bronchitis.
Convulsions and Brain Disease.
Disease of the Heart.

14 will die of constitutional disease, in order of mortality:

Consumption.
Hydrocephalus.
Scrofula.

10 will die of developmental disease almost at birth:

Premature and still birth.
Infantile Debility.

5 will be killed by accident or injury.

17 will die of diseases not classed but belonging to the above classes in undetermined proportion.

There are 250 diseases recognized by physicians. Ninety of them suffice to account for the average deaths in Minnesota, and of that number, but 22 cause more than 1 per cent. of deaths apiece, but 11 cause more than 2 per cent. apiece, and that but 6 cause more than 4 per cent. of total deaths apiece.

In ratio of mortality these last are:

Consumption,	10	per cent.	of total	deaths.
Typhoid Fever,	7¼	"	"	"
Cholera Infantum,	6¼	"	"	"
Scarlet Fever,	6¼	"	"	"
Accident and injuries,	5	"	"	"

This proportion is about the same as of the statistics of 1870, 1871 and 1872, for the state.

Thus four diseases and the class of injuries represent, for our present purpose, the diseases causing the deaths in our population.

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Consumption represents the class of constitutional diseases, so called because largely hereditary, transmitted from parents to offspring. In this class are all forms of Scrofula—Consumption of the Lungs (the most fatal disease of adults.) Water on the Brain, (Hydrocephalus,) the wasting diseases of infancy, (Tabes Misenterica) and scrofulous diseases of all ages of the glands and joints. Other diseases of this class are Cancer, Syphilis, Insanity, and others less important.

Typhoid fever may stand as the representative of another great class of diseases, whose occurence depends upon the transfer of a special poison from the sick to those not yet affected. In this class are Small Pox, Scarlet Fever, Measles, Diphtheria, Spotted Fever, Erysipelas, some forms of Diarrhœa and Dysentery, Cholera, Yellow Fever, some forms of Syphilis, Glanders, Hydrophobia, etc.

In this class are all the diseases which at times become epidemic, causing much sickness, great mortality and exhibiting almost uncontrollable violence and malignity.

Each disease of this class has a special and peculiar poison of animal origin, which must come into actual contact with the body and must besides find there the conditions favorable to its development, before it can induce its peculiar morbid state. It is for this reason that this class is called zymotic.

Cholera Infantum may represent the diseases of the digestive organs in infancy and childhood. They are among the most fatal of the disorders of this age. These poisons gain access in food and drink.

Scarlet Fever may represent the Eruptive diseases of early life. These poisons reach the body oftenest through the air.

Of accidents and injuries 17 per cent. of total deaths are between 5 and 20 years of age.

Death and sickness rate among persons between 5 and 20 years of age.—63 per cent. of total deaths occur between birth and 21 years of age; 18 per cent. of total deaths, between 5 and 21 years of age. The most fatal diseases of this age, and those causing the most sickness and disability, are of the zymotic class.

Typhoid Fever kills 16.5 per cent. of all who die in this period.

Eruptive Fevers.—(Scarlet Fever, Measles, Small Pox, etc.,) 15. per cent. of all who die in this period.

Constitutional disease comes next, Consumption causing 13 per cent. of total mortality.

Of local diseases, diseases of the lungs (other than consump-

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tion) cause 6.4 per cent., and diseases of the brain 3.3 per cent. of all deaths of this age.

It is probable that the fevers cause at least 40 per cent. of all deaths during the school going age.

Excluding Consumption at least 80 per cent. of the total mortality of this age is from diseases not inherited, but whose causes begin their operations after birth and most of them after 5 years of age.

Children are peculiarly susceptible to external influences, good and bad, and furnish, therefore, many victims of this class of diseases. In fact their average health is a very delicate test of the healthfulness of the house or neighborhood in which they live.

A preventable disease is one whose causes can be wholly or partially removed, or their operation in part or entirely prevented by sanitary measures—so that its occurrence shall be much rarer than when not so controlled, *eg.*, Small Pox can be literally "stamped out" by vaccination of the well, and seclusion of the sick. Cholera, Typhoid Fever, Scarlet Fever, Measles, etc., may, by seclusion of the sick and by disinfection, be confined to the original or to a few subsequent cases. This method of prevention involves the co-operation of local authorities with Physicians and Health Officers. There is another method which is available for individuals and families. It consists in constant and intelligent use of every means to maintain the health of persons and families at the highest possible point.

This is to be done by securing most perfectly for all: pure and abundant Air; pure and abundant Water; abundant sunlight; good sufficient, varied and properly prepared Food; Healthy Work; Healthy Recreation; Healthy Rest and Sleep; in short, the highest normal development and use of body, mind, and moral nature for the longest time consistent with the laws of life. This is the aim of Hygiene. The means are:

1st. A body of educated Physicians for Health Officers, devoted to original research and acting, as teachers of Hygiene and executors of sanitary laws.

2d. Popular education as to the necessity for and methods of preventing disease and improving health.

3d. Legislation which giving authoritive expression to the popular will shall secure to every citizen his rights in this direction. The unit of Hygiene is the individual and the family. Its most important field is the home, the physical representative of the family life. These it reaches through education. Therefore it aims to interest and enlist parents and teachers to cordial and intelligent co-operation.

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"E."

SMALL-POX.

CIRCULAR OF THE STATE BOARD OF HEALTH.

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CIRCULAR.

Small-pox is epidemic in many towns in Wisconsin, and continues to spread where it has found a foothold. It has also broken out in a very severe form in Manitoba. No cases are as yet reported in Minnesota, but our people are in constant communication with the infected localities. "Prevention is better than cure," and the State Board of Health urge upon physicians, local authorities, school boards, and especially upon parents, to make every effort in their power to secure a thorough vaccination of our population. In this way can we with the greatest certainty prevent an epidemic of this dreaded disease. The operation is so simple and free from danger; the result is so certain and positive that no one has an excuse for neglecting to use it.

All that is necessary to secure success is

First—That the virus is fresh and pure.

Second—That it is carefully introduced into the little wound.

Third—That revaccination be advised, and used, as the only *sure* evidence of protection.

To remove, as far as possible, all doubt of the purity of the virus used, this Board have instructed their secretary to furnish, at cost price, 10 ivory points for $1, or a single ivory point for 25 cents, charged with animal virus direct from the heifer, to all who enclose the money with the order, but they assure the people that, equally pure virus is easily obtained through reputable druggists, or better still from their physicians, under whose care it is always best to have vaccination done. Should small-pox appear anywhere in the State, this board request that any one, knowing the fact, give notice of it immediately to the secretary, at Red Wing, that we may co-operate with the local authorities in limiting it to the place where it occurs. Send the notice by telegraph, if possible, C. O. D.

By order of the State Board of Health.

CHARLES N. HEWITT,
Secretary.

Office of the Secretary State Board of Health, Red Wing, Minn.

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"F."

SMALL POX.

ITS HISTORY AND THE MEANS USED FOR ITS PREVENTION.

COMPILED BY THE SECRETARY.

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SMALL POX.

"The origin of this destructive disease is involved in obscurity. It is said to have been mentioned in very ancient Chinese manuscripts, and in Brahmin records 3366 years old." We have positive record of its occurrence in the last quarter of the 6th century. It soon became, throughout the known world, a naturalized plague. In the 18th century it was the cause of mortality in 1 in 12 of all deaths. Among those attacked by the disease 20 per cent. died. In the confluent form it killed one-half. It is altogether probable that no other pestilence, including the other plagues of the middle ages, has ever been so fatal to man as small pox. The annual mortality in Europe alone from this disease was very nearly 500,000. This was due to the fact that unlike other pestilential diseases "it was universally prevalent, among all races of men; among all ranks of society; in both sexes, at all ages and in all seasons; it made itself at home everywhere; attacked a large proportion of the population; and caused a very large proportion of deaths." Evidence of its secondary influence is found in the fact that from one-half to two-thirds of the blind in England before the 19th century owed the loss of sight to the small pox.

Two methods of preventing the great mortality of this disease have been thoroughly tried: inoculation and vaccination. Inoculation was the first experiment. "There is no doubt that it was practiced by the Brahmin's of Hindostan from a very remote period; and the Chinese have long 'sown' the small-pox by inserting a crust into the nose. In 1717 the wife of the English Ambassador to the Turks, had her son inoculated there, and in 1722 her daughter of the same age was inoculated in England. It was then tried on six condemned criminals; then on five paupers; then on children of aristocratic families, and lastly upon the English royal family, after which it became general. One advantage of inoculation was the assured mortality of the disease, 1 in 50 as against 1 in 5 from the natural diseases. In 1721, in New England, the

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natural disease killed 1 in 7; inoculation 1 in 51; in North Carolina the proportion was 1 in 5 to 1 in 100.

The misfortune was that small pox by inoculation was as contagious as the natural disease and so became a cause of its universal spread. Still it is probable that good resulted from the practice in the absence of anything better.

The discovery of vaccination was in this wise:

Edward Jenner was apprenticed to a surgeon near Bristol, England, in a country where cow pox prevailed. One day a young woman came into his master's surgery and speaking of small pox and its dangers, said: "I cannot take the disease for I have had the cow pox." The remark impressed itself in Jenner's mind, he spoke of it to his fellow students, to the great Dr. John Hunter, his preceptor, and after beginning practice for himself talked of it so much in his medical club that his fellow practitioners threatened to vote him a bore. He made his first experiments in 1795, published the result in 1798, lived to see the triumph of vaccination, and died in 1823, aged 74 years.

The vaccine virus is a matter found in pustules on the udder and teats of the milch cow. This local disease is the small pox modified by passing through the body of the cow.

The operation of vaccination consists in the insertion of this matter, (direct from the cow or that has passed through the human body) into the human system by punctures in the skin. It gives rise to a local inflammation and the formation of a little pustule.

The appearance of this pustule on the seventh day after the operation was stated, by Dr. Jenner himself, to a lady who asked, to be "that of the section of a pearl on a rose leaf." The description is as accurate as could be given.

It is proven by long trial that vaccination is "a preventive of the natural small pox in the great majority of cases, and that when it does not prevent an attack it mitigates its severity more certainly than a previous attack of small pox itself does."

Jenner lived long enough to witness the complete vindication of his claims, and now small pox is by his simple discovery almost completely under human control. The objections to vaccination at present are directed chiefly against the use of humanized virus (that which has passed through a number of human bodies.) It is claimed that in this way other and dangerous diseases have been communicated. It is not proposed to argue this question.

The State Board of Health are prepared to furnish pure and fresh animal vaccine directly from the heifer. They have no

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money at their disposal to pay for such supply, but the secretary will furnish it to all desiring it at its cost.

There is therefore no longer any excuse for neglecting the use of this simple precaution.

We have but one other suggestion. The power of vaccination varies with individuals. With some it lasts for a life time; with the majority for a longer or shorter term of years. The proper course then for all is vaccinate in infancy, repeat it at puberty, and always thereafter when in the presence of the disease, or in anticipation of its probable approach.

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"G."

HOW TO PREVENT SMALL-POX, SCARLET FEVER, MEASLES, DIPHTHERIA,

AND OTHER ERUPTIVE DISEASES, INCLUDING TYPHOID FEVER, WITH INSTRUCTIONS FOR THE MANAGEMENT OF ANY OF THESE DISEASES WHEN THEY OCCUR.

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REPORT.

No time can be more opportune than the present, when some of these diseases are prevailing to an alarming extent in adjoining States, for a popular review of their origin, mode of prevention, and treatment.

Sanitary science takes ground far in advance of popular belief and practice in regard to eruptive and almost all other fevers.

Each of these diseases is caused by a specific animal poison, generated in the bodies of the sick, and conveyed by air, water or food, into actual contact with the bodies of the well.

Every person suffering from any one of them produces enough of its peculiar poison (if collected, preserved and used as carefully as is the virus of cow-pox,) to inoculate a very large number of people. But the fact is that a single case, with rare exceptions, actually transmits the disease to but few others. The spread of these diseases is chiefly due to the fact that every new case is another and distinct centre of contagion; often in different families, and remote from each other.

There are two natural obstacles to the spread of these disorders constantly operating, and of which we can avail ourselves, to prevent their occurrence at all; or if they have occurred, to limit their influence, and as to some of them, "stamp them out" altogether. These are:

I. A higher standard of private and therefore of public health.

II. The destructive action of pure and abundant air, water and sunlight.

To their influence is due the partial removal of a considerable number of what are known as proximate causes of disease, operating upon whole populations. It is a matter of history that the great plagues and pestilences have always been coincident with phyiscal, mental and moral destitution, suffering and depravity, and that with the immense advances of our civilization, in supplying better buildings, drainage, water supply; with a greater

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variety and abundance of food in great centres of population, and the better condition in all respects of the agricultural populations, the operations of the specific poisons which produced those fearful scourges, are now confined to limited geographical areas, and have not for many years assumed anything like their former proportions. Of these plagues but two remain. One, the cholera, makes occasional excursions from its home in the valley and delta of the Ganges; the other, small-pox, is rarely absent from some part of the country, and occasionally, as at present, in Wisconsin and Manitoba it prevails extensively as an epidemic.

Vaccination will certainly control small-pox, on the single condition, that it be thoroughly and carefully used; and that the little operation be repeated in the presence of the disease.

This truth ought to receive a formal recognition in more stringent legislation. It is unworthy of our time and intelligence that the prejudice of ignorance should be permitted any longer to be the single barrier to the practical extinction of this loathsome disease.

The other natural agencies mentioned are obstacles to the spread of every form of contagious or infectious disease. So powerful is their influence that if they could be given free operations upon the victims of these disorders by their careful seclusion from intercourse with other people, and their care and treatment in roomy, thoroughly ventilated and well-lighted houses, these diseases would be practically excluded from any but a small share of the sickness and death rate of our population, and the number of deaths among those who did suffer their attack would be much less than at present. Chemistry has come to the aid of hygiene by affording a variety of cheap and efficient disinfectants, which can be used as adjuncts to the natural methods, but can never take their place. Our main reliance against these, as all other forms of disease, must always be constant and careful attention to the sanitary condition of the home and the family.

They are the units with which all successful effort must begin. Failing there sanitary work is nearly paralyzed and helpless. Let every parent and citizen, therefore, aid in the diffusion of sanitary knowledge among the people. It is a very great mistake, still a very common one, to suppose that small pox is the only contagious disease against which organized effort can be of use.

The mortality of scarlet fever, measles and whooping cough is greater, on the average, than small pox among children, (see article on death rate, etc., in this volume.) They are all amenable,

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to a considerable degree, to the general preventive measure we have mentioned.

Attention is called to the following circular, copies of which can be procured on application to our secretary, at Red Wing.

MINNESOTA STATE BOARD OF HEALTH.

SANITARY MEASURES AGAINST SMALL POX, SCARLET FEVER AND MEASLES, AND OTHER ERUPTIVE DISEASES.

Care of the Patient.—The patient should be placed in a separate room and no person except the physician, nurse, and in case of a child, the mother, allowed to enter the room or touch the bedding or clothing used there until they have been thoroughly disinfected.

As soon as the disease is apparent, and until convalescence is complete, the patient should (subject to the order of the attending physician, if there is one,) be anointed over the entire body, once or twice daily, with the following mixture; it will be found to relieve the irritation of the skin and acts as a powerful and efficient disinfectant: Take Carbolic Acid, crystalized, 20 to 40 grains, Sweet Oil, a half pint; warm the mixture till the solution of the acid in the oil is complete, when it is ready for use.

As soon as convalescence is complete the patient should be thoroughly washed with warm water and soap and put on fresh, clean clothes.

Care of the Sick Room.—It should be kept well ventilated, but so as not to expose the patient to direct currents of air, and should occasionally be fumigated slightly, by throwing upon a heated surface a few teaspoonsful of a solution of Carbolic Acid, made by dissolving one ounce of the crystalized acid in a quart of rain water. Pieces of cloth may be soaked in this solution and suspended in the room and in the hall adjoining. All vessels for receiving discharges of any kind from patients should be emptied immediately after use, and cleaned with boiling water, and should constantly contain a small quantity of the above solution.

All clothing bedding, carpets, or other articles, not absolutely necessary for the use of the patient, should be removed from the room before he enters it, and all articles used about the patient, as sheets, pillow cases, blankets and clothes *must not* be removed from the sick room till they have been disinfected.

It is advised not to use handkerchiefs about the patient, but rather soft rags for cleaning the nostrils and mouth, which should be immediately thereafter burned.

The ceilings and side walls of the sick room, after the removal of the patient, should be fumigated, cleaned and whitewashed, and the wood work and floor thoroughly scrubbed with soap and hot water.

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Disinfection of Clothing, Bedding, etc.—All such articles impregnated by the eliminations of patients suffering from contagious or infectious disease, may be disinfected.

I. By exposure to a continued high temperature.

II. By fumigation.

III. By the use of a proper disinfecting fluid, as follows:

1st Method—By Heat.—The clothing and other articles should be suspended, separate from each other, on lines or by other means, near the ceiling of the room in which the disinfection is to be effected. The temperature is then to be raised by fire to at least 130 deg. Farenheit (no higher is necessary) and maintained so for at least two hours, after which the articles should be exposed to air and sunlight for a few hours longer.

2d Method—By Fumigation.—Arrange the room and articles to be disinfected as for the first method, then take, in an earthen or wooden vessel, four (4) pounds Chloride of Lime, moisten it with water, and add thereto a pint of Muriatic Acid. Chlorine gas is rapidly generated and permeates every article. Keep the room closed for an hour or two and then thoroughly ventilate it. While occupied by the patient the sick room must not be fumigated in this way.

3d Method—By a Disinfecting Fluid.—Prepare in a tub the following mixture: Sulphate of Zinc, 8 ounces, Carbolic Acid, 1 ounce, Water, three (3) gallons. Sheets, pillow cases, blankets or clothes, should be soaked in this fluid at least an hour and then placed in boiling water for washing.

Feather beds and pillows, hair pillows and mattresses, and flannel and woolen goods should be disinfected by the first or second methods, and should not be removed from the sick room till this has been done. All straw and excelsior mattresses must have their contents removed and burned and the ticks washed after soaking in the disinfecting fluid.

Water closets and privies, drains and foul places in houses, stables or yards, should be disinfected daily by the use of the disinfecting solution.

Above all things, be it remembered that in these, as all other diseases, there are no substitutes for pure air, sunlight and fresh water. Let the sunlight and air in wherever they can reach; open and dry all cellars; keep the grounds around dwellings *dry* and *clean*, and let personal and domestic cleanliness be everywhere observed.

In the case of Small Pox, *vaccination* and revaccination are of the greatest importance, affording the *best* obtainable protection against its occurrence, and mitigating its severity when not preventing an attack.

By order State Board of Health,

CHARLES N. HEWITT, Secretary.

Secretary's Office, Red Wing.

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"H."

THE INSPECTION OF THE PUBLIC INSTITUTIONS FOR 1876.

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REPORT.

This general report is made up from the special reports of committees of the board who have made personal visits and inspection of all the State institutions.

In justice to all we have to state that these visits are made without notice, and that our committees have always been received with courtesy, and every facility has been afforded to assist us in our work.

THE HOSPITAL FOR THE INSANE.

We find this institution in excellent condition. The beautiful building has finally been finished, according to the original plan, and in most respects it reflects credit upon those who have had the matter in charge.

It is a source of surprise that a structure of its capacity, beauty and solidity could be erected at an expense of only $486,000.

During the past season, much has been done towards beautifying the grounds, grading, tree planting, etc., and much more remains to be done. The farm attached seems to have been well conducted, but it is too small, only 384 acres in all, with less than 100 acres fit for cultivation; and we think it should, if possible, be enlarged.

The supply of water for the asylum is excellent in quality, but its source is such that it will always require great care in providing it in sufficient quantity. For laundry purposes, the rain water cisterns now in use are ample.

A thorough inspection of the hospital buildings and patients gave us assurance that the management was both strict and humane. The attendants were intelligent, and apparently kind to the patients. The patients themselves were orderly, and, as a rule, neat in appearance. The rooms, dormitories, and halls were clean, and the dining-rooms, closets, dishes, etc., were in good order. The beds were neat, and most of them were provided either with a hair or cotton mattress, placed on the top of one of

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shucks, straw, or of woven wire. Only about eighty of the patients now sleep on straw beds. Each bed was supplied with two blankets and a counterpane, and the sheets and pillow-cases, we were informed, are changed positively once a week, and as much oftener as necessary. Most of the beds have a strip of carpet beside them, and look quite comfortable. Some of the rooms contain two beds where there should be only one, and some of the dormitories have ten beds where no more than seven should be allowed. The steam heating apparatus works well, and the buildings are all kept comfortably warm, but there is some fault about the ventilation. The air in most of the halls is not changed so often as it should be, and is close and oppressive. We would recommend a more free use of the blower, or fan, which now, for economy in fuel, is only used when the air becomes extraordinarily bad. The water-closets, although clean, and apparently closely watched, give out a strong odor, and are very troublesome. The drainage of the buildings and grounds is excellent. The basement which is under the whole structure, is dry and airy, and kept scrupulously clean. An ample air shaft furnishes, through this basement, the supply of fresh air to the halls and rooms above.

In a portion of the basement are found the laundry, drying and ironing rooms; the roomy kitchen, engine room, store rooms and a few work rooms. Of these last we think there should be more.

The old buildings in town have been repaired and put in order for the reception of patients, and already about forty have been sent there. When crowded these old buildings will hold about one hundred patients, but they are not suitable for hospital purposes, and are badly situated. They should be abandoned as soon as possible.

The management of the hospital appears economical, and it is doubtful if the current expense can in any way be reduced. The food for the patients seemed to be abundant, and the conveniences for preparing it ample.

During the summer a number of the patients were employed on the farm, and a few are regularly kept busy carrying wood for the engine, helping about the laundry, mending clothes, &c. Amusements have been provided to some extent, and in the female wards plants and flowers give occupation to a few of the patients; but what most painfully strikes a visitor to this as well as to most other asylums for the insane, is the fact of so many apparently able-bodied men and women sitting around with nothing to do.

We believe that very many of them are able, and should be systematically trained to work; and that a greater amount of liberty

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might be allowed them without detriment to themselves or others. The great bulk of the insane are not sick. Of the 524 patients in confinement at this institution, Superintendent Bartlett informs us only 80 are now receiving medical treatment; and at the time of our visit, we only found three men and one woman in bed.

Neither are they according to the usual acceptation of the term, "mad men." They are simply human beings whose minds to some degree have lost that balance which is necessary to enable them to think and act for themselves. A few require restraint, and many need the careful watching of intelligent attendants; but it does seem a cruel thing to treat all the insane indiscriminately as felons or jail breakers, and for years reduce them to a state of enforced idleness.

Dr. Fraser, an English physician of long experience in the care of the insane, says: "Employment judiciously planned is not only a means of cure to the recent insane, but it benefits also the incurably insane; it mitigates their lot."

Dr. H. B. Wilbur, of New York, who has recently made a tour of inspection to the British insane hospitals, found that 72 per cent. of the insane were employed in useful labor. He says: "The out door life and exercise are there used as an important means in restoring bodily functions; in fact the medical officers do not wait until the patients are in good bodily condition before putting them to work, but set them to work as a means of securing a healthful physical condition."

The important result of this plan is that occupation bodily and mental, diminishes the excitement of the patients, produces quiet and contentment, and thus obviates the necessity for seclusion and mechanical restraint.

The greater amount of liberty necessary where the work system is carried on would not make it easier for either officials or attendants, but in the language of Dr. Wilbur: "The question is not what is most convenient or most agreeable to the officers of the institutions, but what most concerns first, the recovery, and then the welfare and comfort of the patients. All personal considerations must bend to these."

Dr. Wilbur speaks with emphatic favor of the system of open door treatment, witnessed by himself at several asylums in Scotland. In many wards he found all doors unlocked, the patients going in and out at their pleasure when not occupied.

His inquiries were particularly directed to the question of escapes and of suicides or assaults. And he found there was usually no inclination on the part of the insane to run away. He was

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also assured by the manager of the asylum, where most liberty was allowed, that suicides had not increased, and that even among the insane criminals a large proportion could be safely allowed to handle tools.

As we stated in our report one year ago, the demand for increased accommodation for the insane is urgent. More buildings and more land suited for such labor as the insane may be capable of, must be provided.

The census reports show that insanity is increasing throughout the United States at a much greater rate than the increase of population. The census of 1860 shows the population to have been 31,443,321, with an insane population of 23,999; or one insane person in every 1,310 of the whole population. The census returns of 1870 show an increase of insanity of 55 per cent., while they show also that the general population of the states has increased only 22 per cent. From these figures of the census, and bringing the calculation up to the year 1865 inclusive, at the same rate of increase for both sane and insane population, we find the whole population to be 42,115,896, with an insane population of 44,148, or one insane person in every 953 of the whole population.

Even this is not so bad as in England, where, according to Dr. Wilkins, Commissioner of Lunacy for the State of California, they have one insane person to every 403 of the sane population.

Dr. Conrad, of Baltimore, Md., has collected some data from the census returns of 1870, showing that California exhibits the greatest proportion of insane to sane population of all the other States, being one in every 484. Massachusetts shows the next greatest proportionate number of insane.

The New England States, as a whole, far exceed the other group of States in their relative proportion of insane to sane population. The Northern States come next in order of proportion; the Western States third, and the Southern States show the smallest relative numbers of insane. Dr. Conrad concludes that "the increase of insanity has progressed rapidly throughout the country, notwithstanding the number of hospitals that have been built for the treatment of the insane, and notably so in greater proportion wherever the occupation of the people has departed most from agricultural pursuits."

From these facts he argues that while it is a just, humane and wise policy for every State to have one hospital, or more if necessary, for the curative treatment of its recent cases of insanity,

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it is wholly unnecessary for them to build extensive and expensive hospitals for the incurable and chronic cases of insanity.

Dr. Conrad strongly urges the building of cottages for the accommodation of chronic cases, on the land attached to each State hospital already in operation. This was one of the four plans suggested in our last report as being practicable in this State.

We would now respectfully recommend that a commission be appointed to decide upon the location and character of the buildings required for the rapidly increasing insane population of this State.

There are now in the St. Peter hospital 524 patients; 289 males and 235 females. Of these the superintendent estimates over 400 to be incurable.

Admitted during the current year	249
Discharged	139
Died	42

INSTITUTION FOR THE DEAF AND DUMB AND BLIND.

Statistics.

Present during the year		123
Deaf-mutes	101	
Blind	22	
Present at date of inspection		97
Deaf-mutes	82	
Blind	15	

Applications on file for admission—

Deaf-mutes	10
Blind	None.

By the census of 1875 there are in the State—

Deaf-mutes, 268, of whom 31.1 per cent. in school.
Blind, 111, of whom 13.8 per cent. in school.

The demand for admission into the Deaf and Dumb Asylum is greater than the accommodation. There is no call at date for admission to the Blind Asylum, although it it is hardly more than half filled.

This is all wrong but the fault is not with the Asylum. The managers are anxious for more scholars, because (and the fact is very important) the education of this class should begin at the

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earliest practicable moment. Its difficulty increases much faster than the years of the pupil.

The ventilation and warming of the Deaf and Dumb Asylum is as last reported, fair, but not what it ought to be.

In the Blind Asylum the ventilation is not well under control, and an element of danger has been introduced into the interior of the main building against which, had this Board known of it, we should have thoroughly protested. The water closets have been located there, and when inspected there was a decided draft of air through the seats into the room, and of course into the air of the whole house. It will be impossible to prevent this entirely, and with the best apparatus and strictest care water closets in such a place can hardly be other than dangerous to the health of the inmates. We advise their removal. We are glad to report that the general sanitary condition of these schools is good. But we advise that more time and attention be given them at present, to the physical education of the children, especially of the Blind. This disability is more physical than mental, and oftener involves other parts of the body than the organs of sight, hearing and voice. Physical culture is therefore a very important part of their training. The danger is, on their part at least, that this training be rather to make up for the lost organs that to secure as far as possible the greatest improvement for the whole body. We advise the assiduous cultivation or a taste for out of door sports, and that abundance of time and encouragement be given for this purpose.

More good may be expected from such a course than from the use of any system of gymnastics or any other plan which divorces physical exercise from the pleasure which belongs to it, as a natural instinctive want of the child.

THE NORMAL SCHOOLS.

That at Winona is in fine condition. The ventilation is, however, very defective, and the reports of former years apply to its provision for water-closets and water supply.

Since this inspection, the principal writes that by utilizing the heat of the furnace in the lower hall, he has secured a better draft through the great ventilating shaft, and so improved the ventilation of the whole building.

The school at Mankato is in the same condition as at last report. Five large furnaces are found inadequate to the heating of this building, because of defective ventilation. We have suggested

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changes which will materially improve the ventilation, and add to the comfort and health of the pupils, and to the safety of the building.

STATE PRISON.

Total capacity	215
Males	212
Females	4
Number of convicts at date of inspection	165
Males	162
Females	3

And the number is increasing.

Of the convicts at present here, 31 are murderers, serving a life sentence. This number will probably be 35 in January, 1877.

No distinction of labor, discipline, or isolation is made between this class and the convicts committed for the shortest period and the least crime.

The sentence to "hard labor" means no more than to such labor as the contractors find the convict can do for their advantage.

The average age of the whole number of life convicts is 30.8 years. The youngest is 19 years, and the oldest 59. The average term of imprisonment of the other convicts is 2.7 years.

For two years and less	48.4 per cent.
For less than 5 years	80.3 per cent.
For less than 2 years	23.7 per cent.
For less than 1 year	11.4 per cent.

The average age of those serving a sentence less than 5 years is 28.1 years; youngest, 16; oldest, 63.

There is no school except a voluntary one, on Sunday, offered to such as choose to avail themselves of it. Some of the convicts read and write in their cells at night.

Under the judicious care of the warden, the library is increasing in value and variety, and the use of the books is freely offered to the prisoners who avail themselves of the opportunity to an encouraging extent.

The ventilation of the cells is as imperfect as ever; some of them are for this reason unfit for use.

The prison yard, when the necessary laundry building is erected, will be as full as it ought ever to be. The out-houses and drains connected therewith need thorough reconstruction; we have suggested their ventilation by connection with the great smoke stack of the shops.

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Referring to previous reports, we repeat our recommendation that a new site be selected and a new prison be begun which shall be fully up to the most approved construction and organization.

In such a prison the warden should be (as in the present one, under existing arrangements, he cannot be,) responsible, not merely for the food, clothing and safety of the convicts, but for their labor and discipline. It will then be possible to make the prisons what they are intended to be, institutions not merely for punishment, but for reformation.

REFORM SCHOOL.

Many improvements have been made the past year; and the general condition of this institution is excellent.

The supply of water, however, is still deficient, and we urgently recommend that an additional source be provided. The proposed artesian well would probably give an abundant supply. The water now in use is not only insufficient, but is, at times, impure.

During the year, 31 pupils were admitted, 29 were discharged, and 2 escaped. Remaining under instruction, 139.

No death occurred during the year, and there has been no sickness of any consequence.

In view of the reported prevalence of small-pox in a neighboring state, most of the inmates have recently been revaccinated.

FINANCIAL STATEMENT.

Appropriation for Board		$1,000 00
Expended—		
Secretary's salary	$500 00	
Traveling expenses of Board	128 65	
Postage, telegrams and express	24 50	
Subscriptions for Sanitarian	18 00	
Printing	19 00	
For labor in experiments in heating apparatus	12 29	
Thermometers	6 00	
Extra compensation for preparing article on School House Warming and Ventilation	$200 00	
In hands of Secretary for reserve traveling and telegrams for Board	78 75	
	$982 19	

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ERRATA.

Page 6, 15th line from bottom, for facts read tracts.
Page 39, V., for creation read location.

NOTE.—Some of the statements in articles on "Vital Statistics of an Average Minnesota Population," and on "Infant Mortality," derived from Mass. State Board of Health, and New York City Health Board Reports, and from other authorities, would have been acknowledged in foot notes, had the writer, as was expected, been able to correct the proofs. Several other errors escaped correction for the same reason.

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INDEX.

	Page.
Air—Fresh air, amount required in inhabited rooms	36
Air—Out-door, movement and supply of	36
Air—Out-door, amount required for school room	39
Air—Out-door and in-door, supply, compared	22
Air—Room. Impurities of and their sources	36
Air—Ground, as a cause of disease	23
Air—Cellar, dangers of	23
Air—Impure. How to detect	23
Air—House, as a carrier of disease	36
Air—Amount of, required by an adult	37
Air—Pure, why necessary	37
Air—Pure. How to obtain, in the house	23
Buildings, Public. Faults of, original construction	8
Buildings, Public.—Plans of, should be filed with State Board of Health	8
Bed—The, as a cause of disease	23
Bed—The proper material for	23
Bowels—Diseases of, in infancy	17
Blind—Number of, in State and in Asylum	77
Blind—Should be sent to Asylum early	77
Blind—More attention to physical education advised	78
Blind—Institution, ventilation defective	78
Blind—Institution, water closets in, badly located	78
Board of Health State—Names and residences of members	4
Board of Health, State—General report	5
Burt, State Supt.—Letter as to hygiene in common schools	27
Cholera—Origin of	68
Cholera—Prevention of	67
Cholera—Poison of, enters body in food and drink	20
Children—80 per cent. educated in common schools	33
Children—Expectation of life	48
Children—Death rate under 20 years	52
Children—Causes of death among	17
Children—Very susceptible to disease cause	21
Cholera Infantum—Deaths by	17
Croup—Varieties of, importance of recognizing	18
Croup—Mortality by	17

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Convulsions, infantile..... 17
Conduction, as a method of heating..... 38
Capitol building, example of faulty original construction..... 8
Davis, Dr. E. J., appointment as member of Board..... 9
Death rate in childhood..... 15
Death rate in school-going age..... 52
Death rate at different ages..... 19
Death rate at different ages..... 47–49
Drum—Heating, proper use of..... 40
Diseases—Number of, recognized by physicians..... 51
Diseases—Number of, accounting for mortality in Minnesota..... 51
Diseases—Prevention of, the object of hygiene..... 5
Disability from other causes than acute disease..... 50
Disease, the bed as a cause of..... 23
Disease, specific poisons of, their origin..... 20
Disease preventible, definition of..... 53
Disease, poisons, how they produce disease..... 20
Disease, poisons, how destroyed..... 21
Disease, poisons, natural agencies destructive of..... 67
Diseases and Death, causes of..... 50
Diseases, wall paper and carpets as causes of..... 23
Diseases, causes of, to be looked for in and about the house..... 23
Diseases—Eruptive, most fatal when epidemic..... 17
Diseases—Eruptive, influence of, on infant health..... 17
Diseases—Eruptive, prevention of..... 68
Diseases—Eruptive, how to care for sick in..... 69
Disinfection of clothing, bedding, etc..... 70
Eruptive diseases—Infant mortality from..... 17
Eruptive diseases—Care of sick from..... 69
Erysipelas, poison of inhaled and inoculated..... 20
Experiments in heating and ventilation..... 6
Family The, the unit of sanitary work..... 68
Foul air duct, location and use of..... 41
Fresh air duct, location and use of..... 41
Fire-place, how it warms..... 38
Food—Infant..... 24
Food—Starchy, improper for infants..... 24
Food—Infant, patent secret of..... 24
Filter water, simple arrangement of..... 24
Financial statement..... 80
Growth, stages of..... 48
Gronvald, Dr. Ch., appointed as member of board..... 8
House Air—Sources and impurities of..... 35
House Air—Sources and impurities of..... 22
House Air—How to keep pure..... 23
House Air—Frequent cause of disease..... 5

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Hospital for Insane—Sanitary defects of 74
Hospital for Insane— Farm should be enlarged 73
Hospital for Insane—Old building should be abandoned 74
Hospital for Insane—Ventilation defective 73
Hospital for Insane—Is full 77
Hand Dr. D. W., reappointment as member of Board 9
Hewitt Dr. C. N., reappointment as member of Board and Secretary 9
Insane—Number of, in hospital 77
Insane—Number of, under medical treatment 75
Insane—Number of, incurable 77
Insane—Condition of the average in hospital 75
Insane—Enforced idleness of, a cruel thing 75
Insane—Lack of occupation for, in hospital 74
Insane—Ought to have regular work 74
Insane—The chronic do not require expensive hospitals 77
Insane persons increasing in the U. S 76
Insane persons in western States 76
Insane—English management of 75
Insane—Cottages for chronic cases 77
Infants—Diseases of, originate in home 17
Infants—Food for 24
Infants—Deaths of, by accident 6
Infants—Clothing of 25
Infants—Bathing of 25
Infants—Irritability of, often due to mental rather than physical causes 25
Infants—Irritability, means of overcoming 25
Infants—Physical training of 25
Infants—Age of, at death 19
Infants—Causes of greatest mortality among 20
Infants—Mortality, essay on 15
Infants—Mortality, per cent. in United States and Minnesota 15
Infants—Mortality, in town and country 15
Infants—Mortality, too great 15
Infants—Mortality, popular explanation of 15
Infants—Mortality, assigned causes often incorrect 15
Kerosene Law—State Inspector's report 48
Life—Expectation of, by U. S. census 48
Lungs—Diseases of, in infancy 17
London average annual death rate 8
Measles—Infants death by 17
Measles—Poison of, inhaled 20
Normal Schools—Winona 78
Normal Schools—Mankato 78
Normal Schools—Mankato, ventilation very defective 78
New York average death rate 48
Old age 48

Digitized by Google

Organic matter as cause of disease..... 36
Organic matter, in excretions of skin and lungs..... 35
Plagues of the middle ages, causes of..... 57
Plagues—Two remaining..... 58
Population, average Minnesota, statistics of..... 47
Prison, State—Statistics of..... 79
Prison, average age of convicts in..... 79
Prison, ventilation of..... 79
Prison, new one advised..... 80
Room sick, care of, in eruptive disease..... 69
Re-vaccination, reasons for.....57-63
Radiation as a means of heating..... 38
Reform School, statistics of..... 80
Reform School, water supply deficient..... 80
Scrofulous disease—Inherited..... 18
Scrofulous disease—Forms of in infancy..... 18
Scrofulous disease—Per cent. of infant death by..... 17
Spotted fever—Infant death by..... 17
Stove, The—How it warms..... 38
Stove, The—Regulation of draught in..... 41
Stove, The—Proper location for..... 40
Scarlet fever—Per cent. of infant mortality of..... 17
Scarlet fever—Poison of, inhaled..... 20
Sustaining class—The proportion to dependent class..... 49
Small-pox—History of..... 57
Small-pox—Mortality from before vaccination..... 61
Small-pox—Poison of, reaches body in air and by inoculation..... 20
Small-pox—Inoculation for, history of..... 61
Small-pox—Vaccination for, history of..... 62
Small-pox—Natural obstacles to..... 67
Small-pox—None in Minnesota at date of report..... 7
Small-pox—Epidemic in Wisconsin and Manitoba..... 7
Small-pox—Duties of citizens as respects it..... 53
Small-pox—Duties of School Boards..... 53
School House, Common—Average, Minn..... 38
School House, Common—Essay on heating and ventilating..... 34
School House, Common—Usual method of warming..... 39
School House, Common—Temperature and amount of air required for 39
School House, Common—Best examples of, in towns..... 6
School Room—Impurities of air in..... 36
School Room—Temperature of air in..... 39
School Buildings—Difficulties of..... 6
Sickness, expectation of..... 50
State Teachers Association as to Hygiene in common schools..... 27
Secretary of Board—Duties as Prof. of Public Health at University... 6
Secretary of Board—Letter to Supt. Burt..... 28

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Senkler, Dr. A. E., resignation of membership 8
Sickness—Average annual rate of 50
Typhoid Fever—Poison of, reaches body in food and drink 20
Thermometer—Necessity for use of 38
Vaccination—Power varies with individuals 57
Vaccination—Rules for use of 63
Vaccination—Operation for safe 57
Vaccination—How discoverd 62
Vaccine Matter—Origin of 62
Vaccine Matter—From healthy heifers provided by the board 62
Ventilation—Definition of 35
Ventilation—Defective, dangers of 35
Warming—Definition of 35
Warming—Difficulties of 39
Working age of life 48
Water—Purity of, means of ascertaining 24
Water—Soft or hard for children 24
Whooping Cough—Infant mortality 17
Whooping Cough—Poison of, inhaled 20
Winona—School buildings of 6
Warming and Ventilation, defects in 6
Warming and Ventilation, difficult to secure 6

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SIXTH ANNUAL REPORT

OF THE

State Board of Health

OF

MINNESOTA,

JANUARY, 1878,

PRINTED BY AUTHORITY.

MINNEAPOLIS:
JOHNSON, SMITH & HARRISON.
1878.

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MINNESOTA STATE BOARD OF HEALTH,
SECRETARY'S OFFICE,
RED WING, Jan. 1, 1878.

To His Excellency Hon. John S. Pillsbury,

Governor of Minnesota.

SIR:—I have the honor herewith to transmit the sixth annual report of the State Board of Health.

Very respectfully,

Your obedient servant,

CHARLES N. HEWITT,

Secretary.

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CONTENTS.

		Page.
1.	List of Names and Residences of Members of the Board	5
2.	General Report of the Board	7
3.	The Effects of the Immigration on the Norwegian Immigrant	17
4.	Report on the Meteorology of Minnesota, for the years 1875–76, 1876–77	45
5.	The Sanitary Water Survey of Minnesota; Work for 1877 in Red River Valley, with Chemical Analysis of Samples of Water	57
6.	A Chemical Examination of Samples of Enameled Iron Ware, with Reference to their Domestic Use	67
7.	The Relations of Scholastic Methods to the Health of Pupils in the Public Schools of Minnesota	71
8.	A Letter upon the Causes and Treatment of Pauperism, with the Methods and Experience of the St. Paul Society for the Relief of the Poor	109
9.	Small Pox Reports, and Notes of its Occurrence in the State in 1877	112
10.	Financial Statement	117

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MEMBERS STATE BOARD OF HEALTH.

D. W. HAND, M. D., St. Paul.
V. SMITH, M. D., Duluth.
CHARLES N. HEWITT, M. D., Red Wing.
FRANKLIN STAPLES, M. D., Winona.
W. H. LEONARD, M. D., Minneapolis.
E. J. DAVIS, M. D., Mankato.
CH. GRONVALD, M. D., Holden.

NOTE.—All communications for the Board should be addressed to
SECRETARY STATE BOARD OF HEALTH,
Red Wing, Minn.

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GENERAL REPORT FOR 1878.

The State Board of Health and Vital Statistics respectfully report:

That during the year 1877, there has been no general or epidemic [redacted] popu- [redacted]ch was

ERRATA.

Dr. Gronvold's address should be Norway, Goodhue Co., Minn.

PAGE	LINE	
" 9,	"	3, from the top, for "Hoeston" read "Hocston."
" 45,		In the fourth paragraph, after "furnished by the" read "gentlemen who took charge of the instruments provided by the board, under the direction of Dr. Senkler."
" 45,	"	4, from the bottom, for "within the station" read "within the State."
" 68,	"	4, from the top, tor "ptates" read "plates."
" 71,	"	18, from the top, for "teochers" read "teachers."
" 73,	"	10, from the bottom, for "Institintion" read "Institution."
" 75,	"	1, from the top, for "Are no" read "No."
" 82,	"	12, from the top, for "posltion" read "position."
" 86,	"	1, from the top, for "Fobweli" read "Folwell."
" 90,	"	8, from the bottom, for "Free" read "Few."
" 90,	"	1, from the bottom, for "grinding" read "guiding."
" 93,	"	12, from the top, for "where they enter" read "when they enter."
" 106,	"	6, from the top, for "Snellen's Type" read "Snellen's Type."
" 106,	"	5, from the bottom, for "exercises" read "examinations."
" 116,	"	13, from the bottom, for "cnfluent" read "confluent."
" 116,	"	3, from the bottom, for "means" read "precautions."
" 121,	"	13, from the top, for "Sjudalskhed" read "Spedalskhed."
" 121,	"	18, from the bottom, for "Thomas Pry, B. F." read "Thomas, Prof. B. F."

he ad- 00 per- e popu- ck, and irst, in ccured recog- Health, stance. ections was re- for any rompt- te out.

Drs. E. C. Cross, of Rochester, and N. Eugh, of Elgin, did good service in the use of vaccination in the sections of Viola, adjoining those towns.

The other endemic broke out in Wadena, Wadena County, in the northern part of the State, in June, 1877. The Local Board of Health applied to this Board for vaccine, and a physician, and by request of the Board, Dr. John C. Rosser, of Brainard went to Wa-

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GENERAL REPORT FOR 1878.

The State Board of Health and Vital Statistics respectfully report:

That during the year 1877, there has been no general or epidemic prevalence of any form of disease, and the average health of the population of the State has been fully equal to that for 1876, which was above the average of preceeding years.

SMALL POX.

This disease has been epidemic for more than a year in the adjoining State of Wisconsin, where there have been nearly 2,000 persons attacked by it, of whom more than 400, have died. The population of Minnesota have escaped up to date any general attack, and there have been, during the year, but two endemics. The first, in the southern part of the State, in Viola, Olmsted County, occured in the spring. As soon as the character of the disease was recognized in May, 1877, the Chairman of the Town Board of Health, Hon. M. L. Sawyer, applied to this Board for advice and assistance. He was immediatedly supplied with vaccine virus, and directions for controlling the disease, and Dr. N. S. Teft, of Plainview was requested to act for this Board and to call upon the Secretary for any assistance required. Both Mr. Sawyer, and Dr. Teft, acted promptly and confined the disease to the locality in which it broke out. Their reports are submitted. (Appendix.)

Drs. E. C. Cross, of Rochester, and N. Eugh, of Elgin, did good service in the use of vaccination in the sections of Viola, adjoining those towns.

The other endemic broke out in Wadena, Wadena County, in the northern part of the State, in June, 1877. The Local Board of Health applied to this Board for vaccine, and a physician, and by request of the Board, Dr. John C. Rosser, of Brainard went to Wa-

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dena, and vaccinated about 75 persons, supplying them with disenfectent and advice.

On the 25th of June, the Secretary of this Board went there to consult with the Local Board as to the measures to be taken. He found them discouraged by the lack of efficient co-operation on the part of the citizens in their efforts, and advised that the people be called together. He met them in the depot building and did what he could to inform and reassure them and to induce them to assist the Board. Dr. Rosser of Brainerd, and Dr. Kurtz of Moorehead, being unable to take charge of the sick in Wadena, Dr. Wilson of Moorehead, (recommended by Dr. Kurtz,) was at the suggestion of the Secretary employed by the Local Board to take charge of the hospital, and to act as health officer. The history of the outbreak and action of local authorities with expenses and results are given in a report hereto appended. (Appendix.)

Outside the resident population of the village and town of Wadena four persons stopped at the hotel long enough to take the contagion away on their persons—one, a commercial traveler, went thence to Winnepeg, and came down with confluent small pox there, where he was visited by the Secretary of this Board. Another went to the Yellowstone and died of the disease, another went thence to home (via. St. Paul) in Litchfield, where under the management of Dr. F. E. Bissell, health officer, the disease was confined to his own case alone. Still another case, a young lady school teacher in an adjoining town, after sleeping in an infected bed, became an inmate of the Wadena hospital, with confluent small pox.

The Secretary of this Board visited White Earth Reservation, vaccinated the agent, missionaries and some of the half breeds and received the promise of the agent and physician that the wandering bands of Indians belonging to this reservation, and who were exposed to small pox from Wadena, should be called in and thoroughly protected by vaccination. The agent also promised to keep this Board informed of any cases of the disease.

The Secretary of the Board went to Winnipeg and arranged with the health authorities of Manitoba for co-operation in case the disease broke out in the lines of travel or in adjoining districts. By the kindness of U. S. Consul Hon. J. W. Taylor, he was given introduction to the Lieutenant Governor and to the health officers of the province. The thanks of this Board are due to Drs. Alfred Codd and J. S. Lynch, the treasurer and secretary of the Manitoba Board of Health, for courtesies extended to our Secretary. Returning, the medical officer at Fort Pembina (Asst. Surg. Gourley) assured the secretary of his willingness to care for any cases of

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small pox which should occur in his neighborhood and to vaccinate all who should apply. The same promise was given by Dr. G. A. Hoeston, of Grand Forks. The steamboat employes were offered vaccination on the steamer Minnesota, of the Kittson company, and many accepted the opportunity.

This Board has furnished fresh animal vaccine virus at less than cost to all who would accept and use it. Vaccinnation and re-vaccination have been more general throughout the State, in town and county, than ever before.

We attribute the happy exemption of Minnesota from an epidemic of small pox chiefly to the precautions above described, in which we have had the cordial co-operation of the medical profession, and of many intelligent citizens who have procured and used virus on their own account. But it can only be by increasing watchfulness that we can hope to escape it in the future.

EDUCATIONAL WORK.

The Secretary of this Board, as non-resident Professor of Public Health at the University, gave a course of eight lectures during the spring term, to the Senior Class upon "*Some of the Problems of our Civilization in the View of Hygiene.*"

I. Health and Hygiene—Public and Private.
II. Disease. Causes and Prevention.
III. Poverty and Pauperism.
IV. Addressed to Young Men.
V. Crime and Criminals.
VI. Hygiene and Education.
VII. The Family and the Home.
VIII. Success in Life.

It was attempted to show by practical illustration the aims and methods of Hygiene, and the necessity and worth of a knowledge of its principles and practice to all men—especially is this true of those whose scholastic opportunities and obligations should make active co-operators in sanitary work in the every day life of our population. It is there that such work is greatly needed, and it is also there that the intelligent sympathy and active co-operation of the educated classes can do much to aid local health boards and physicians, in sanitary efforts.

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THE RELATIONS OF SCHOLASTIC METHODS TO THE HEALTH OF PUPILS IN THE PUBLIC SCHOOLS.

The *facts* of these relations in Minnesota, have never been collected. There is an earnest desire that they should be sought out and presented by competent authority.

This Board, at the request of physicians and teachers all through the State, have undertaken such an investigation. The work is a very practical one. It is the only way to get at the facts as to the influence upon the physical, mental, and moral health of pupils, of co-education of the sexes; of hours and methods of study and school attendance; of existing systems of rating scholastic standing; of the construction, furniture, ventilation, warming and lighting of school houses and rooms, etc. These and similar influences incidental to our schools are alternately praised or blamed with too little knowledge of the exact truth. The report of a visiting committee upon co-education in the University of Wisconsin has renewed the discussion of that question. The substance of that report and the replies of the Regents and President are given elsewhere in this report. As preliminary to the work to be done and to ascertain the present opinions of teachers and medical men upon these subjects, a series of questions was distributed to the leading teachers of the State and some of the vital statistics of the University, Carleton College, two of the Normal schools, the high schools of St. Paul, Winona and Red Wing, as also of the Institution for Deaf and Dumb, were collated by medical men. The result is submitted in the paper on "The Relations of Schoolistic Methods to the Health of pupils." (Appendix.)

It will be seen that there is everywhere a lively interest and that the example of the University in ordering stated examinations to collect and correct the vital statistics of pupils will be followed in every leading school in the State. To assist in this work this Board will immediately prepare and distribute tests for sight, hearing, respiratory capacity, height, weight, and other facts sought for, with instructions for their use, and blanks for sending results.

If the methods adopted at the Uuiversity can be made general through the State, we shall secure during the coming year, a record of well ascertained and reliable facts of the utmost practical value. This record so begun, will increase in value with years. It is only by such systematic and impartial search for facts that the question referred to can be conclusiveiy answered. A reference to the preliminary report will show how valuable and necessary such work really is.

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REPORT ON THE METEOROLOGY OF MINNESOTA.

Compiled by Dr. Wm. H. Leonard, of Minneapolis, from the monthly reports of nine observers in as many parts of the State.

This work sustained by the scientific devotion of the medical and other gentlemen who are carrying it on, is of yearly increasing importance. It will be continued and enlarged.

HOSPITAL FOR THE INSANE.

This Institution is full, and speedy provision must be made for more accomodation, here, or elsewhere for the insane, The success of the treatment of this increasing class of unfortunates, depends very largely upon the use of hospital care at the earliest practicable moment after attack.

In view of the fact that what is further done, will decide for years to come the general policy of the State in this direction, this Board advises the appointment of a commission of thoroughly competent men, to collect and report to the legislature all the data necessary for a conclusion as to the best methods of meeting the admitted necessity for more provision for the insane.

FEEBLE MINDED CHILDREN.

There are (20) twenty Idiots and Imbeciles in the Hospital for the Insane and applications are constantly received at the Institution for the Deaf, Dumb, and Blind, for the admission of such children. There is no provision for their care in the State, public or private. We repeat our suggestion of last year that a school for such children be organized. We believe competent private parties will undertake it if the State will pay them what it now costs to maintain these children in the State Institutions.

The proposition of the Trusteesof theInstitution for the Education of the Deaf, Dumb, and Blind, in this years report, is worthy of serious consideration. They will organize such a school if the State will allow them the salary of an expert to conduct it.

BLIND ASYLUM.

As a small proportion of this class in the State avail themselves of this Institution, we repeat our recommendation that Prof. Noyes or other competent person be sent out to visit such cases and remove the objections, now so common to Asylum care and education for the blind.

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STATE PRISON.

We repeat the recommendation for the erection of a new prison in a better location with larger grounds, and with the occupation of the prisoners so determined by the Warden that he may be as responsible for every effort at their reformation as he now is for their care and punishment.

The number of convicts for life is already large and increasing. There are no adequate means of separating the hopelessly vicious from those who may be reformed, and the influence of the present arrangements cannot but be bad upon the younger and less hardened prisoners. Two prisons will in time, be necessary. Rather than further enlarge the present one, it will be far better to begin another, more in accord with the demands of modern prison reform. Let it be so constructed and organized that the reformation and education of prisoners will be as well provided for as their confinement and labor. *It is only so that, with the increasing number of convicts for life and for long terms, the State can avoid educating the younger and short term prisoners, for a life of crime after their discharge.* In the present prison this result is under existing arrangements almost unavoidable, and the Warden is practically helpless to prevent.

THE EFFECTS OF THE IMMIGRATION ON THE NORWEGIAN IMMIGRANTS.

Attention is called to this paper on page 17. It is the first attempt in this country to study the effect of immigration upon one of the great nationalities who have cast their lot in our State. Dr. Gronvald collects and collates the experience of himself and several other thoroughly educated Norwegian physicians upon this important subject. The paper is a very original and interesting one. It is to be followed by others of a similar character.

THE SANITARY WATER SURVEY OF THE STATE.

The work done this year was a preliminary survey of the water supply of the Red River Valley. In this investigation this Board asked the regents of the University to permit the co-operation of the Geological Survey. They did so, and Professors Winchell and Peckham accompanied the Secretary of this Board. Together they visited that valley from Breckenridge to Fort Garry, and the samples of water and clay agreed upon were analyzed by Prof. Peckham, whose report (Appendix "C,") will repay careful study. One result

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unexpected to all was the discovery that the water of the Bois de Sioux, Otter Tail, and Red Rivers are good drinking waters, better than any well water examined by the survey. The cause of trouble with many of the wells of that valley is as yet unascertained, but this Board repeat our suggestions of previous reports. A further examination of the well water of this region will be made.

POVERTY AND PAUPERISM.

The increased demand for charitable relief during the fall and winter, the probability that the demand will be still greater before spring, induced the Board to ask a paper from Rev. E. W. Chase, the indefatigable City Missionary and Relief Secretary, of St. Paul, on this subject.

He gives, besides, the methods of the St. Paul Society for the Relief of the Poor. They have given such satisfactory results there, that they are worthy of the consideration of those who find a system necessary in the distribution of charity in other cities, towns, or even in counties. It is to be hoped that the St. Paul society will, with their present work, collect and arrange their statistics of pauperism, with reference to the age, sex, nationality, occupation and history of applicants, and the relation of their condition to vice, crime, or heredity. Many of these facts are best collected by a medical man of whom, we venture to believe, there are some in St. Paul, willing and ready to assist. If this is not done much valuable knowledge and experience will be lost, not only to local, but to other students and workers in this direction.

SANITARY EXHIBIT AT THE EXPOSITION INTERNATIONALE, PARIS.

This Board have received a cordial invitation from the Section of Anthropology and Sanitary Science to make an exhibition of the Meteorelogy Life and Death rate, Disease prevalence, etc. of Minnesota: This will be done by other States, and certainly, no more convincing evidence of the opportunities offered by our State for Health, and Labor, could be offered than by a truthful exhibit, by statistics and charts, of the facts in our possesion and by the distribution of a Report specially prepared for the purpose. If the Legislature will authorize the work and provide for its cost, we will undertake it immediatedly, as there is no time to be lost. The volumes of the Reports for previous years are nearly or wholly exhausted, and the call for the present Report is three times greater than the number, which we have to distribute (300 copies.) This demand is constantly increasing.

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We respectfully ask for an edition of 1,500 copies of succeeding Reports.

The appropriation for the Board will be exhausted when all outstanding accounts are paid.

The statement of expenditure is appended hereto.

All which is respectfully submitted.

CHARLES N. HEWITT,
D. W. HAND,
V. SMITH,
FRANKLIN STAPLES,
W. H. LEONARD,
E. J. DAVIS,
CH. GRONVALD,
Members State Board of Health.

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APPENDIX.

THE EFFECTS

OF

THE IMMIGRATION

ON THE

NORWEGIAN IMMIGRANTS.

BY

CH. GRONVALD.

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THE EFFECTS OF THE IMMIGRATION ON THE IMMIGRATED NORWEGIANS.

The characteristics of a people, its physical and intellectual [illegible] are to a great degree the result of the circumstances

ERRATA.

PAGE	18,	LINE	15, from above, instead of "sea of 4,000," &c., read "sea of as high as 4,000," &c.
"	18,	"	24, from above, "3,000" read "8,000."
"	19,	"	2, from above, "and" read "of."
"	19,	"	24, from above, "the country through" read "the country extends through."
"	19,	"	8, from the bottom, cut out 15.
"	20,	"	5, from above, for "Thrombo," read "Thromso."
"	20,	"	15, from above, "cultivatoin" read "cultivation."
"	20,	"	24, from above, for "has as it is most" read "as most exposed."
"	21,	"	8, from above, "Semgin" read "Semlin."
"	21,	"	19, from above, "Nord Rep" read "Nordkap."
"	22,	"	8, from above, "Horald" read "Harald."
"	22,	"	9, from above, "Norweigian" read "Norwegian."
"	22,	"	16, from the bottom, "since" read "at."
"	24,	"	13, from the bottom, "cases" read "causes."
"	26,	"	19, from above, "after" read "often."
"	28,	"	7, from the bottom, "North" read "Norse."
"	29,	"	17, from above, "of causes" read "of the causes."
"	29,	"	25 & 26, from above, "emmigrants" read "immigrants."
"	31,	"	8, from above, "frinds" read "friends."
"	32,	"	5, from above, after "accustomed" add "to," and in place of ";" read ","
"	35,	"	5, from above, for "mile" read "mille."
"	35,	"	9, from above, "protected" read "protracted."
"	35,	"	22, from above, "Novdra" read "Nordre."
"	35,	"	11, from below, after "this" insert "is."
"	39,	"	19, from above, "Sacarlatina" read "Scarlatina."
"	40,	"	19, from below, "escanthematica" read "exanthematica."

[illegible] and more opinions expressed. It will especially be interesti[ng] hear from every one of the different immigrated nations by w[hich] amalgamation the future Minnesoteans will be formed.

To understand the nature of the changes the Norwegians [are] exposed to when coming here to the Northwest, it is necessary [to] premise a short description of their native country and its principal sources of subsistence and other relations, together with the antecedents of the people as regards emmigration. Afterwards we

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THE EFFECTS OF THE IMMIGRATION ON THE IMMIGRATED NORWEGIANS.

The characteristics of a people, its physical and intellectual development, are to a great degree the result of the circumstances under which it has lived, and depend besides on the descent—the race—on the climate and nature of its native country as deciding its means of subsistence, and on its situation and facilities for intercourse with other countries.

Change of one or more of these conditions will in the course of time result in the gradual change of the habits of the people, of its physical and mental constitution. Studying these causes and results will be of the greatest scientific and practical interest.

In those Europeans who have lately immigrated to the Northwest it is of course too early to try to point out lasting changes as the result of the difference of circumstances in which they now live, as such changes have hardly as yet taken place. All that we at present have to search for are indications of the future development. The question is essentially one of statistics; accurate statistical observations through years, with this object in view, are necessary for a satisfactory solution of the problem.

They are also necessary for the discovery of the immediate and for a part only temporary results of the change of climate, of manner of living and other relations, for which only very little reliable material is at hand. It will however be well to have attention called to the subject, that more observations can be made and more opinions expressed. It will especially be interesting to hear from every one of the different immigrated nations by whose amalgamation the future Minnesoteans will be formed.

To understand the nature of the changes the Norwegians are exposed to when coming here to the Northwest, it is necessary to premise a short description of their native country and its principal sources of subsistence and other relations, together with the antecedents of the people as regards emmigration. Afterwards we

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will look to some of the conditions of the immigrants, and to some of the forms of disease which seem to originate here from their changed conditions.

Norway is situated along the Atlantic Ocean and northern part of the North Sea, and is the highest and most mountainous part of the Scandinavian Pensula, of which Sweden is the eastern lower part, sloping towards the Baltic. The country may be considered a great mountain, in which the valleys and their prolongations, the fjords form crevices, often enclosed by almost perpendicular mountain sides several thousand feet high.

Of the whole country, whose area, is about 120,000 square miles, one half more than Minnesota—nearly the same as Great Britain and Ireland—the half is more than 2,000 feet above the sea; this half is chiefly made up of stony terraces of an elevation above the sea of 4,000 feet or more in the southern part of the country, and decreasing to about 2,000 feet in the northern districts. With a vegetation only of grass, dwarf-birches and willows. they are uninhabited except in summer, when some of the residents of the valleys move with the cattle up to the luxuriant grazing grounds on the broad back of the mountain or in valleys, too elevated for permanent habitation.

On this mountain plateau as a basis are laying higher mountains. of which 2,500 square miles are covered by eternal snow, and where some peaks of an alpine character reach a hight of about 3,000 feet above the sea.

Of the rest of the country which consists of lower terraces of different elevation, and of valleys the greater part is rocks and woods, lakes and rivers, while less than 700 square miles are under the plow.

To the west the great mountain plateau falls off abruptly, often perpendicularly from a height of several thousand feet, into the surrounding ocean, or its inlets, forming a rough, ragged and precipitous coast, torn asunder by innumberable incuts—fiords—and surrounded by a vast number of rocky islands, between which there are numerous first-class harbors. Approaching the land from the sea, it has an inhospitable appearance, only barren granite and gneis rocks and steep precipices in view, where hardly any landing seems possible. Coming nearer and between the islands, living houses may be seen in some crevice in the rocks or on some strip of land under the mountains, while the coasts for long distances may be inaccessible. In some places, at the end of a fiord, or where some side valley interrupts the course of the mountains, the habitable pieces of land are wider and the large and well built dwelling

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houses and barns surrounded by luxuriant fruit gardens, fields of barley and oats and woods and deciduous trees, or farther away from the sea, of evergreens.

On the east side, the plateau slopes gradually to the lower hills of the eastern inland, where the valleys are wider and longer, and sometimes at the sea or along some inland lake from small plains, with larger farms and a denser population. Farther east in Sweeden, the country is lower with long and wide valleys, separated by low hills, and with considerable plains. While in Norway the half of the area has an elevation of more than 2,000 feet above the sea, in Sweden, hardly 1-10th has that elevation, and almost one third of the whole country has a less elevation than 300 feet,

Near up to the great mountain plateau, especially on the west side, the valleys are very narrow and in some places exposed to slides of stones and rocks, and in the winter of snow, which frequently have carried away every trace of human habitation. There is hardly any civilized country, where as many deaths by accidents are recorded through the year, caused by the nature of the country and the occupations of the people, especially by those on the rough surrounding sea. Norway had in 1874, 1,248 deaths from accidents, in a population of 1,800,000–1875–which is 0.69, pr. mill, while Minnesota, the same year had 258 deaths, from that cause in a population of 600,000, May, 1875, which gives 0.43 pr. mill.

The country through more than 13 deg. from 58 deg. lat. N., to 71 deg. 12 min., with a breadth in the southern part until 64 deg. of about 250 miles. and for the rest of the country northward very narrow, until the most northern part, where it widens again. On account of this northern latitude the *distribution of light*, the relation of night and day, is very different from what they are in Minnesota. Not alone is the light distributed otherwise the year around, but the high latitudes get more light than regions nearer the equator, as the refraction there will prolong the stay of the sun above the horizon for a longer time than it will in lower latitudes, where the course of the sun is more perpendicular to the horizon. At Nordkap the sun is visible for three months at once without setting, while in the winter it is 15 under the horizon for two months. Also in the country south of the polar circle the summer days are much longer than in Minnesota, and the twilight lasts in the whole country from sunset to sunrise, while in the greater part common print can be read at midnight without light.

The climate is, in spite of this high latitude, very mild and equable, owing to the situation along an ocean, traversed and warmed by the gulf stream, of which a branch runs north of Scotland to

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the Norwegian coast, and to the absence of land or ice to the North. In about the same latitude, where in North America Franklin and his crew perished from cold and exposure, we find in Norway thriving cities, with considerable trade and navigation. Hammerfest, 70 deg. 40 min., with 1600 inhabitants; Thrombo, 69 deg. 38 min., 5,000 inhabitants. Barley is there profitably cultivated, and the country is so far north in the valleys at a little distance from the sea, ornamented with forests of deciduous trees and fir. The fiords and harbors are also ice-free the whole year along the Norwegian coast, up to the Russian border, where the gulf stream has taken a more northern direction and does not come near to the land, while other relations begin to have influence, and where consequently another climate commences.

Farther south the summers are warm enough for the cultivatoin of rye and wheau, and for the production the nicest apples and pears, besides plums, cherries, and small fruit. The common breadstuff is barley and oats, of which the first is cultivated to 70 degrees, north latitude, where it, on account of the continued warmth and light of the sun, ripens in a wonderfully short time. Potatoes are raised over the whole country and make an important article of diet. Maize, melons and grapes are not cultivated, as they, even in the most southern part, only in exceptional years, ripen in a few favored places.

The west coast has, as it most exposed to the influence of the sea and the gulf-stream, has an island clime, with much rain, not very warm summers, and with winters so mild, that sheep fine their food outdoors the whole year. The winters are not colder there than in the middle of Germany, and the land round the lower Danube, at the Black Sea, on 45 degrees north latitude. The eternal snow commences at a little over 4,000 feet above the sea in the southern part, while the glaciers extend farther down in the valleys. In the northern part of the country, where the mountain plateau is only about 2,000 feet above the sea, the snow everywhere melts away in the summer.

The eastern slope of the great mountain plateau, is comparatively an inland, with an inland climate. The summers are warm, and will, in spite of the late spring, ripen the crops as early at least as on the west coast. The winters are longer and more severe, so the inner parts of the fiords may freeze, And there are some places, that almost enjoy a Minnesota winter, minus the wind and the sudden changes. For there, contrary to what here is the case, very cold weather, is commonly calm. The farther east, the greater is the difference of temperature in summer and winter. In Sweden it

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is greater than in Norway, and in Russia the climate is almost of the same character as here in the Northwestern States of North America, the situation also having some similarity in being far from the sea, and in being one level from the warmer regions around the Black Sea, to the Northern ocean; which is here in winter filled with ice, and less influenced by the gulf stream, and besides cooled off by the presence of some large islands which are most of the year icebound.—Nowaji Semgia—and by the proximity of the far north extending, and very cold, Siberian plain, which in winter over the sea is practically one plan to the pole. The following table will give a general view of the temperature and rainfall in different parts of Norway, for comparison with the same in St. Paul, Minn.

PLACE.	Latitude	Middle of the year.	Average in January.	Average in July.	Rainfall.
South point, Lintesnes	58 deg.	44 deg.f.	34 deg.f.	59 deg. f.	40 imches.
West coast, Bergen..	60 "	44 "	34 "	57 "	70 "
East side, Christiana	60 "	43 "	27 "	64 "	20 "
West coast at.....	62 "	44 "	34 "	55 "	40 "
Nord Rep. N.-most pnt. Norway, Europe.	71 "	32 "	18 "	48 "	Don't know.
St. Paul, Minn.....	45 deg.	41.48 deg.f.	2.35 deg.f.	73.81 deg.f.	33.30 inches.

Norway is by its extensive always ice-free coast, and by its abundance of splend'd harbors especially adapted for a seafaring nation; and so have the Norwegians been from earliest history. They were the first who built ocean ships instead of old coasters; they discovered Iceland, Greenland and America. To this day they have in proportion to their number the most sailors and most ships of all the nations in the world. Sixty-five thousand regular sailors, besides fishermen and coast traders, in a population of 1,800,000—1 sailor in 32 inhabitants—man a home fleet of 1,400,000 tons, and contribute to man the fleets of other nations. The Norwegian colors are seen on all seas and Norwegian sailors are found on the ships of almost

*The average for the year is for St. Paul the middle of the three years 1872-3-4; the average for January and July are for 1875. This table demonstrates the thermal differences between the west coast and the inland of Norway, and St. Paul, Minn. While the difference between the averages of the warmest and the coldest month of the year in Bergen on the west coast is 23 deg., it is in the eastern inland of Norway at Christiania 37 deg., and at St Paul, Minn it is 76 deg. In St. Paul the highest range in any month of 1875 is for November, ween it is 79.5, and in the year it was 127.

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every seafaring nation. Other than from navigation the Norwegians derive their living from agriculture and raising cattle, and from the products of the rich fisheries, and of the forests, which mainly consist of pine and spruce, and higher up in the valleys of birch; in the southern part there are some forests of oak and beech.

The people have always, as a generic mark, had a liking for adventure and travels; they have several times settled on foreign soil. When Horald Haarfager, one thousand years ago united the numerous small Norweigian principalities into one kingdom, love of liberty drove numbers of Norwegians into voluntary exile. They settled Iceland, where they founded a republic, that continued for almost 400 years, when they at their own request were re-united with the Kingdom of Norway. At the same time they also settled in great numbers on the opposite coasts of Great Britian and the Northern coast of France, in which places the characteristics of their race, love of freedom and love of the sea, can yet be traced in the present population. Everywhere they showed the same elasticity in adapting themselves to changed circumstances, and in making the best out of a chance. That the Icelanders under the most unfavorable conditions from climate and soil, and secluded from the other world, to this day have retained and developed their old civilization, demonstrates in a striking way the vitality of the people.

The Norwegians were from old times a literary people and have a large old literature, especially historic—saga's—: They are the only germanic people from whom any considerable national literature, since or before that time, has been transmitted, and through them we have chiefly our knowledge of the old germanic mythologie (in Edda.) Literary accomplishments were as highly esteemed as deeds on the battlefield, and poetry was a ticket of admittance everywhere. This respect for intellectual occupation is transmitted to the present Norwegians. They especially, as their nearest relations, the Swedes, show preference and talent for mathematics and mechanics. Of the common people every one can read, and all the younger write.

Judging then a priori, from the descent and the natural drift of the people, it seems to be justifiable to expect that the Norwegians will do well as Immigrants and easily adapt themselves to the new natural and other relations they come into.

INTELLECTUAL INFLUENCES.

The conditions of the European immigrants are in many respects the same for all. They have to go through the same trouble of set-

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tling affairs in the old country, converting their property into money and planning for the future. Then as soon as they come to America, with its active life and its popular government, with its newspapers and railroads, easy intellectual and material communications, that work against isolation and indifference, they can not avoid being carried away by the current, and acted upon by some of the many agencies that unite in promoting reflection and independent action. The immigrants from other than British origin have also to go through a very civilizing and reflection furthering process in learning the language. The immigrant is consequently exposed to many agencies that tend to educate his intellectual powers, and favor a higher development. This will have influence not alone in their civil life, but also in their relation to health and disease, and as far as some of the agencies continue to exist, on their future habitus.

MATERIAL INFLUENCES

Arrived in America, the immigrants are also exposed to some material conditions which will effect their physical development; these are especially the change of climate and of diet.

From the equal temperature of their native country, the Norwegians come to an inland clime with hot summers, cold winters and sudden changes of temperature, which extremes are yet made greater, as the country is part of a plain extending from the pole to the tropics.

As such a climate, on account of its great ranges, perhaps as regards produce and vegetation, is preferable to a more equal temperature (Prof. Blodget) so it is possible, that it, when it besides has the other qualities of the Minnesota climate, also is the best for the highest development of man. The dry healthy and invigorating air promote the animal functions, while the well marked seasons of the year give a pleasant variation, and invite to reflection and circumspection.

But to appreciate that kind of a climate, it is necessary to be accustomed to it, as the inhabitants of most of the States east of the Rocky Mountains are, and the immigrants in course of time will be. It will have its inconveniences for people who come from a more equable climate, at least before they learn how to prepare for those, to them, unusual extremes.

The immigrants commonly arrive in the hotter season, in the latter part of June, and most of them have at once to commence working. The influence of the heat seems however on the prai-

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ries of Minnesota, where sunstroke is very rare, only to be passing, and chiefly to be of consequence when connected with indiscretions of excessive water-drinking or of sudden cooling off in the evening after a hot day's work. In the valleys or farther south the cases may be more severe. Dr. Smith, of Decorah, says: "By working in the hot weather or perhaps by the thereby occassioned immoderate water-drinking, are frequently cases brought on of great prostration, carrying with it chronic weakening of the nervous system, manifesting itself in general or special hyperæsthesia, with palpitation of the heart as a frequent sequence. Such cases are marked by their obstinacy against all treatment."

The new comers suffer frequently (on account of not being used to the climate and to the diet) from protracted diarrhœas.

Also the old settlers are exposed after excessive water-drinking or sudden cooling off after work, especially in the later part of the summer, in August or September, when the nights commence to get cooler and when the harvest gives them the hardest work, to violent diarrhœas with vomiting, and watery, sometimes bloody discharges and reflex cramps in legs and thighs. Although seldom causing death, and that only among old and weak individuals, these attacks are sometimes followed by great and protracted prostration.

The diarrhœas of small children are far more frequent and severe than in the old country. Especially in the cities is the number of infants carried away by these diseases, very great.

DYSPEPSIA.

In spite of the invigorating influence the bracing air of Minnesota has on the organs of digestion, the most common chronic complaint among the Norwegians is, in America as it was in Norway, chronic gastrites and dyspepsia. Some of the cases seem to be the same here as there. The uniformity of the diet and the want of proper selection and dressing of the victuals (especially here in America.) abuse of coffee, and in some cases of alcoholic liquors. But while in many places of the old country the bulk of the victuals compared to the nourishing elements may seem to favor gastric disorders, here the change to a different diet, more nourishing but improperly selected and prepared (and for that reason not easily digestible,) will favor the same condition. To this is added in America the want of necessary rest after meals, and possibly the limestone water commonly used here in the northwest.

In the greater part of Norway the food of the poorer classes was chiefly farinaceous. Of unbolted barley and oats was, with water,

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made soup and porridge, and flat-bread, thin as paper, crisp and easily digestible. Of these materials together with milk, potatoes, salt herring or other salted fish, and, once or twice a week, salted or smoked meat and pork, was the bill of fare commonly made up for the classes that chiefly furnish the immigrants to this country. Of these victuals great quantities had to be taken to give the necessary nourishment, and the fare was also very uniform. In the upper valleys, where the principal source of subsistance is cattle-raising, the diet was more one of milk and meat, than it was in the chiefly agricultural districts.

Here in America, under ordinary circumstances, the materials for good and nourishing food are within the reach of everybody. What is wanted is popular knowledge—how to make a proper selection and to cook it well.

In Minnesota the common fare among the Norwegian farmers is pork and meat, commonly much salted, to preserve it in the warm summer, potatoes, wheat-bread and coffee. These materials for furnishing nourishment are very different from what was had in the old country. Instead of the voluminous farinaceous dishes, they have pork and meat, more nourishing, but also more difficult to digest. Instead of the easily digestible flat-bread, they have wheat-bread, commonly not well baked, and often eaten warm. People refer frequently their dyspeptic disorders to the fine wheat flour they here use for bread, instead of the unbolted meal they, in the old country, were accustomed to. The fare is also uniform, with little variation for the different meals, and seldom are other vegetables used than potatoes.

Coffee is used altogether too much, although not more than in many places in Norway. Instead of the bulky, essentially farinaceous food of the old country, the immigrants have got a more concentrated and nutritious diet, equally uniform and more difficult of digestion.

The limestone water is possibly an assisting cause of the many dyspepsias, as neutralizing too much of the acid of the stomach. Sour eructations are seldom met with, while regurgitations of tasteless or bitter water and undigested food seem to be a common symptom.

Dr. Hoegh, of LaCrosse, Wis., has the impression, that "Gastrites, chronic catarrhs of the mucous coat of the stomach, are not so frequently met with as in Norway, while the dyspepsias here are foremost." Also an assistant cause to the frequency of dyspepsia is the short time allowed for resting after meals. The poor immigrant, who has nothing to rely upon but his strong arms, understands

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that time is money, and he does not think he can spare the time necessary for proper digestion.

These are some of the causes, why, here in the abundance of good materials for food, dyspeptic disorders are probably as frequent as in the old country, where the same people could not always obtain the proper materials.

The climate acts invigoratingly on the digestive organs, when the above named unfavorable relations do not counteract its beneficial influence. There are several cases, where people, who in Norway suffered from indigestion, here have regained tonicity of the digestive organs.

The conditions named give rise also to several nervous disorders. Thus it is observed, that besides Hypochondriasis, the frequent followers of dyspeptic troubles, these conditions are also frequently accompanied by various neuralgic spmptoms. Dr. Smith, of Decorah, Iowa, says, "In this"—inappropriate diet—"is the cause to be found for the frequency of dyspepsias, that almost always are accompanied by intercostal neuralgia," and frequently also by trigeminal neuralgia, after assuming the type of migraine." Another colleague expresses himself, as follows: "A whole series of nervous symptoms that accompany the dyspepsias, as palpitations, fleeting sensations along the course of the nerves, and disposition to hypochondriases, seem to me to be frequent here."

It is also to be noticed, that neuralgia is very common in Minnesota. Dr. Hand of St. Paul classes it in frequency next to influenza and chronic rheumatism, which he considers the most frequent diseases of Minnesota.

NERVOUS DISORDERS AND NERVOUS DEVELOPMENT.

Of the disorders of the nervous system Hypochondriasis and Hysteria seem to be very common among the immigrated Norwegians, and are supposed to be more frequent here than in Norway. For this several reasons seem to present themselves, besides those named. The people are not accustomed to the climate. In spite of the invigorating influence of the climate noticed by all who are used to a similar one, it is common to hear immigrants, especially later arrivals, complain that they do not feel so well here as in the old country. They give as causes besides the hard work and the victuals, the air as being heavy and not so healthy. they assert that in this level land it is heavier to walk than in their native mountains, and heavier to work. The cause of this feeling is perhaps, besides the two first named, that their organism is not yet

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prepared for this climate—is not acclimatized. People live quicker here; puberty is reached at an earlier age, and the same causes, climatic or other, whichever they may be, that accelerate the vital process in a people of previously slow growth, will also most likely in accelerating the development of the nervous system, promote impressibility and predispose to nervous disorders. There is here a greater demand for elasticity upon the nervous system, obliging it to accommodate itself to the sudden extremes of heat and cold; the severe winter with its snow storms and cold, which the strongest cannot brave for a long time without forethought and circumspection, gives also a reminder to the people who live there of the shortcomings of rude force. It has taught the Indians that thought and consideration are what is chiefly needed to get on in life. They fight their battles more by strategem and patient perseverance than by open force. They have grown to be a cunning and reserved race, excelling in self-control, perseverance and endurance of pain and hardships. This predominant consciousness of the mind ruling the matter, is also indicated by their, for a savage, intellectual features. This climate together with the advantages for development of the intellectual powers, which an active mental and material life gives, has in a couple of hundred years or less made of the active and energetic Englishman, with his bluffness and simplicity, the sharp and calculating American, at least as active and energetic, more delicately organized, and may be superior in inventive power. It would be interesting to search for physical and mental similarities, that in spite of the distance in regard to race and to intellectual and material conditions of life, may have been worked out by the same climate and natural conditions of the country, in the Indians and the immigrated Europeans. The mental and bodily habitus, indicated by the peculiarities of the climate and other conditions of the country, has perhaps not yet reached its final form in any of the European immigrants. It may be, that both New Englanders and later arrivals only represent different phases in the process of acclimatization, and that the ultimate result is not yet reached.

This climate will then probably by its great demand on the elasicity of the nervous system predispose to nervous disorders, at least in individuals not acclimatized.

In this connection it would be interesting to know, in what proportion the old setlers of the eastern states, the descendants of the "May flower" passengers and contemporary immigrants suffer from nervous disorders, compared to the later arrivals of all nations and compared to inhabitants of Europe, who live a similarly active life.

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Aside from the climate, the nervous development of the immigrants will also be affected by intellectual influences. The more animated intellectual life, caused by the new impressions and the new considerations, is as a beneficial mental exercise, conducive to a healthy development of the intellectual and bodily powers. But any additional stimulus sometimes give this development a morbid character, as hard work under partly unfavorable, at least unaccustomed circumstances, homesickness, anxiety and cares of all kinds. The great amount of energy, absorbed in the battle of life, may, by outaxing the mental and bodily powers, cause a morbid condition of the nervous system.

It has been remarked, that Norwegian city clerks look more nervous than is the case with the native clerks. If this should be the case, it cannot likely be attribuied to the change of manner of living alone, as laboring men in the cities from the same nationality and class of society, and living in the same manner, are not observed to show the same affection. If it should be the case, that clerks from the immigrated Norwegians are sooner worn out, than native clerks, it seems reasonable to ascribe it to the unfamiliar mental work. The clerks are in an exaggerated degree exposed to the mental influences, which assist in causing a higher development of the nervous system, and a greater susceptibility to impressions, which may degenerate into irritability and nervous disorders.

In women there is an additional cause for nervous disorders in the early and frequent child-birth, from which they rise too early. This occasions several uterine disorders, of which displacements and especially prolapsus are very common.

Dr. Hoegh of Lacrosse says about the frequency of nervous disorders and therewith connected questions.

"Epilepsie, hypochondriases, hysteria, migraine and similar diseases of the nervous system with uncertain anatomical foundation at least frequent. Without knowing the exact proportion between the frequency of these diseases in Norway and here, I hardly think they there can be so frequent. Almost every settlement and every little city with Norwegian inhabitants has its proportion of hysterical patients, of whom some pass months, even years in bed. It is a notable feature in the habitus of our North American people, that such disorders are so frequent and so intense. It is one of the manifestations of the changes in the constitution of our people. In this connection I will mention, that it seems to me, as if the people in living here get a more nervous character. There seems to be more mental and bodily sensibility. Injuries and the like make a greater impression. There is more impatience when exposed to

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operative encroachments. Patients seem in many respects less hardy, than the old stock of Immigrants. In this I am very far from seeing any effeminacy or enervation. I take it only to be a manifestation of the greater mental development, the immigrants acquire."

Dr. Walloe, of Coonprairie, Wis. expresses it as his opinion, that hypochondriases perhaps, and hysteria certainly, is more common here than in Norway. Otherwise he does not think nervous disorders are more common here than there.

INSANITY.

In regard to insanity we find, on examining the reports of the Insane Asylum, St. Peter, Minn., that there have been admitted to that institution in the ten years, since it was opened, 1864–1874, a proportionately less number of native born Americans that of any other nationality. This is also what might be expected, considering that they are on their own soil, accustomed to the climate, manner of living and other conditions, and not exposed to many of causes that act on the immigrants.

And besides the immigrated Americans are not far from their old home and friends, who might in such an emergency take care of them in or near the old home.

Of the native born Minnesoteans there are very few patients, as most of that class have not yet reached the age in which insanity commences to be more frequent, while this is the case with by far the greater number of emmigrants.

The following table will show the number of emmigrants of each of the principal nations and their share of patients in the Insane Asylum.

Nationality.	Supposed number in Dec. 1877.	No. of Insane remaining in Hospital Dec. 1877.		Total remaining.	Pro mille of nationality.
		Men.	Women.		
Natives of Minnesota	231,750	12	6	18	0.077
" the other U. S.	197,150	98	59	157	0.800
" Ireland	25,300	33	57	90	2.60
" Germany & Prussia	76,500	74	50	124	1.65
" Norway	60,000	53	41	94	1.57
" Sweden	34,500	42	14	56	1.65
" British Provinces	21,000	6	2	8	0.38
" England	9,000	4	2	6	0.66
" other For'n countries	19,800	13	15	28	1.47

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The difference in the p. m. for the Europeon Immigrants is, with the exception of the Irish, not very considerable, and not greater than that it may be accidental.

This is also corroborated by comparing the number of admissions for each nationality, in the course of the first 10 years of the existence of the Hospital, with the average number of inhabitants of that nationality in the same time. The Irish have constantly furnished by far the greatest proportional number of patients in the Insane Asylum, and of these the far greater part has been women, contrary to what is the case with every other nation recorded, where the greater part of the admitted are men, which also seem reasonable, as they in a pioneer life have to bear the brunt of the battle for existence. The proportion for the other nations nas not differed much.

If we compare the above proportions with the same in other countries, we must remember that the children of the immigrants born in America, are counted as Americans, and that this proportion for each foreign nationality is thereby increased, while for the Americans it is made less.

There are at the end of November, 1877, in the Minnesota Hospital for the Insane, remaining 94 patients of the Norwegian nationality, which at the same time in the State is supposed to number 60,000 individuals. This gives 1.57 pr. mill, or 1 insane in 638 inhabitants. If we add the supposed number of the American born Norwegians at the same time, 42,000, to get the same scale for comparison with Norway, the proportion will be 1 in 1,065, which proportion will be too small, as there most likely are some patients in the Insane Asylum from those American born Norwegians. For Norway the report of 1874 is at hand, and there was at the end of that year, remaining in the 10 insane Asylums of the country 976 patients, which in the supposed population of that year, 1,800,000, gives 0.54 pr.mille, or 1 insane in 1844, a smaller proportion, then there by either calculation is found for the Norwegians in Minnesota. If we may then consider the above figures correct as indicating the true proportion, and from them draw any conclusion, they will suggest, that the kind of insanity, which usually is sent to the insane Asylums to be treated, the acquired insanity (distinguished from the congenital insanity—idiotism) is more frequent among the Norwegians in Minnesota, than among their relations in Norway. And this seems reasonable, considering the excitement and cares of an immigrants life, and the acknowledged frequency of hypochondriasis.

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In Norway the insane, treated in the hospitals, is only a part of the whole number, as probably most cases of congenital insanity, the idiots, the number of which there swell the total considerably, are not sent to any asylum. Among the immigrated Norwegians there are most likely not yet many of that form of disease. They, who emigrate, especially the first departing, are commonly sound people, as sick individuals are not apt to leave, before they have family or frinds to go to. There are among the Minnesota Norwegians probably not many more insane than they who are sent to the asylum. When consequently the proportion of the whole number of Norwegian insane in Minnesota, to the whole Norwegian population there, is compared to the same proportion in Norway, the relation will most likely be more favorable to Minnesota, than is indicated by the above figures. In Norway the number of insane is the same as in most other countries, where accurate accounts are kept, 1 in about 300, (in the year 1874, one insane in 327.)

Of suicides there were in Norway in 1874, 135 in a population of 1,800,000, 0,075 pr. mille. In Minnesota. at the same time of all nationalities, 27 in 600,000, 0.045. In Minnesota then, in average of all nationalities, suicides is not as frequent as in Norway. This is also what might be expected, as success, the common achievement of the settlers, is the best mental tonic extant. The industrious and energetic immigrant is almost sure of getting a proper reward for his exertions.

CONSUMPTION.

Minnesota has been reputed as a sanatorium for consumptives, at least in certain stages of this disorder, and it may be interesting to inquire into the relation of the immigrants to this disease.

When in a pioneer land the climate and other conditions are not too unfavorable, or too different from the accustomed there are many influences that will tend to counteract the development of phthisis, and cause it to be less frequent, than in older States with the same climate and conditions of the country. All that activity and energy, with confident expectations of the future, all that free air exercise, with consequent good digestion and strengthend vitality, are incompatible with the progress of phthisis. And when the climate also is healthy and invigorating, as that of Minnesota, the effect of these favorable relations will yet be increased, and the country obtain a repute as a healing place for consumptives. These also, when they move in from other places for their health, besides the gain, they may derive from the change of climate will

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be benefited by the change of habits of life, and their more srict conformity to the rules of health.

This favorable influence of the pioneer life will mostly be to the benefit of the native Americans, they enjoy the advantages with less deduction, as the climate, they have been accnstomed; is of a similar character, but maybe not so dry and invigorating, as that of Minnesota.

For the European immigrants the case seems a little different. On their arrival they meet with several conditions, that for a great part may neutralize the above advantages of manner of living and of climate. However healthy and invigorating the climate of Minnesota may be, and however beneficial it, in that respect is, especially for consumptives, these sudden changes of temperature, to which the immigrants are not accustomed, and against which they have not learned to guard themselves, may prove to be a great disadvantage.

The climate will on these accounts be dangerous for the immigrated Europeans in the same degree, as it is different from their native climate. By indiscretions, based upon their ignorance of the consequences, they frequently incur diseases, which with an experience of the peculiarities of the climate will be avoided. In inducing catarrhs and diseases of the respiratory organs, which follow them, thereby impairing the efficiency and elasticity of that apparatus for supplying the body with fresh air, it will favor the development of that disease, whose most frequent cause is an insufficient aeration of the blood, consumption.

In the immigrant, who without means stands as a stranger in a strange land, and has nothing to rely upon but his own exertions, the healthy activity may frequently be exaggerated in the struggle for existence and over tax his powers. Hence the dyspeptic disorders, which in impairing the efficiency of the organ for supplying the blood with building material, will favor a disease whose characteristics are imperfect nutrition.

Every one, separately, of the named agencies, to which especially the immigrants are exposed, will favor the development of consumption, at least when there is a disposition to it, and all combined may command a strong force in that direction, and may bring on the disease, even without hereditary pre-disposition. But most of the above influences are only temporary. The children and descendants of the present generation, both American and foreign, will live under somewhat different conditions. As the immigrants will be more accustomed to the climate and other influences, and as they learn better to conform with the rules of health, so the ad-

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vantages of a pioneer life will disappear as the land gets cultivated.

The question will be, how the relation will stand in regard to consumption, when matters have become more settled; when the pioneer work is done, and the land cleared and broke; when substantial houses have taken the place of log huts, and more of an indoor life commences; when the reward for all hardships and exertions comes in the possibility of a comfortable life and perhaps luxury.

It is yet too early to draw any definite conclusion in regard to the influence the climate of Minnesota has on phthisis, both because the observations cover too short a time, and because the population, so far, has been, (and in many places yet for some time will be.) exposed to other influences, than will act upon their children and descendants, when the conditions of the country and of its inhabitants have come nearer to their ultimate shape.

It may however be interesting to hear opinions expressed in the light of existing facts, and see how matters now stand. Dr. Hoegh of La Crosse, says: "consumption is very common among the Norwegian immigrants, and this frequency seems to denote that the climate is far from beneficial to individuals, who have a disposition for lung diseases. It would also be difficult to explain, how a climate with such extremes of heat and cold, and sudden changes of them, and how a life, as that of the immigrants full of want and sometimes of sufferings, should influence a disease favorably, whose fundamental character is debilitation, decreasing vitality, and which certainly in some way or other is connected with catarrh. I think I have seen many cases, where phthisis has commenced from a protracted cold; perhaps however the long duration of the cold is an indication of an already existing disposition, as well as the immediate cause of the disposition breaking out in actual disease. One thing is sure, that a disposition to protracted colds is found in many families, where there are, or have been, consumptives. My opinion is, that phthisis is developed in persons who have the disposition by every weakening influence, and I consider it depending on climatic influences so far, as the climate is favorable or not for the development or cure of catarrh. It is not in accordance with my observation, that this climate is favorable for the cure of catarrh or phthisis."

Another colleague in Western Wisconsin has also "found phthisis frequent in this country, among the Norwegians, and in many cases could pre-disposition be excluded. A number of individuals date the disease from their arrival here. It is frequently ascribed to re-

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frigerium." He expresses himself in doubt, whether the climate has a good influence or not. Dr. Smith of Decorah, Iowa, says, "I can not deny that there are many consumptives among our countrymen here, and by a great number of them heriditary disposition can be excluded. But hereby is to notice, that while phthisis upon the whole is unfrequent in the higher mountain valleys of Norway, yet the number of that kind of cases increase lately, and the old immunity does not seem to exist any more. The changed manner of living of this generation, parlor stoves, cooking stoves"—instead of the old chimney,—"Coffee and similar gifts of the civilization, are most likely the cause, not alone in Norway, but also in these localities, and I would not from the existing great numbers of consumptives conclude that the climate is the cause. One thing I think I have observed, and that is that the treatment of this disease brings better results here than in Norway; and this point seems rather to speak for the climate." The medical profession in Minnesota has very decidedly expressed itself in direction of the very favorable effect the climate of this State has on consumptives, compared to the climate of the eastern and southern States of the union, and most have ascribed it to the atmosphere being dry, stimulating, tonic, (see Dr. Staples article on the influence of the climate of Minnesota, upon diseases of the lungs and air passages, 1876). In spite of the admitted frequency of chronic catarrh, (it was the opinion of the majority, that it was more frequent here in Minnesota, than elsewhere,) it was the opinion of 37 professional men against one, (3 being undecided,) that 1st, "tubercular consumption is not as liable to be developed here as in the eastern and souther States, in persons predisposed to it," and of 39 against 2: that 2nd, "the climate of Minnesota favors the cure of phthisis polmonum, originating elsewhere.

After these partly concurring and partly diverging statements, it may be interesting to see what statistics says about it at present, and therefrom to make some comparison.

In the statistics of Minnesota, we find for 1873, of 5,766 deaths the cause of death reported in 4,650 cases, and of these 562, or 12 p. c. reported death of consumption, which in a population of 553,000, gives 1.02 pro. mille of the living. For the year 1874, we find that out of the 6,909 deaths the cause of death is reported for 5,503, 4-5 of the all, and among these are 611, or 11.7 p. c. reported dead of consumption, which in a populuation of 600,000, is 1.07 pro mille of the living. In Europe this cause of death is about 14. 2 p. c. or more of the whole mortality, and at least 3.00 p. c. of the living.

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In Norway we find in the statistics for 1874, that of 32,499 deaths, 31,116 were caused by disease; of these is the cause of death given only in 13,522 cases, or 43.5 p. c. and of them is again consumption reported as a cause of death in 1966 cases, or 14.5 p.c. of all reported causes of death, or in a population of 1,800,000 1.1, pr. mile, of the living, which has been the proportion for many years. This proportion (p. m.) would of course be considerably increased, if the cause of death had always been reported, but as the disease is commonly protected, and as it is known and feared by the people, it is likely that the physicians have been consulted for that disease more frequently than for others, and that consequently, if all causes of death were reported, the proportion of death from consumption would not be increased in the same ratio as others.

The percentage of phthisis to all reported death causes is very different in the different districts. Largest is the proportion in cities and in the districts, where there are most sailors, probably because these suffer more from overexertion and exposure. In Lister and Mandals Amt. it is greatest, the percentage in average for the 3 years, 1872,3 &4, 20.3 p. c. or, more than one fifth of all death, where the cause has been reported, were caused by consumption, while it in one of the districts, where the people chiefly live from the fisheries, Novdra Bergenhus in average of the 3 years, 1872, 3 & 4, it is only 74. p. c. of the reported death causes. The fishermen although frequently worn out by hard work and exposed to the roughness of the weather, can yet prepare better for it by suitable clothing, and diet, than the sailors, while they at the same time have the benefit of an out door life.

In some of the higher mountain valleys consumption is less frequent,(in Christians Amt. 9.4 p. c.) but they cannot in that respect equal, some of the districts on the west coast where the people chiefly live along the border of the sea. The frequency of consumption in Norway cannot be effected much by the elevation over the sea, as in most of the inhabited land this inconsiderable. A great part of the population lives on the sea coast. and by far the greater part lives in an elevation of not more than 500 feet above the sea, while the mountain valleys with comparatively few inhabitants, in some places in the southern part, are permanently inhabited to more than 2,000 feet, (Totak,) Most of the prairies in Minnesota have an elevation of between 800 and 1,200 feet above the sea.

In Minnesota we find in 1873, in a Norwegian population of 43,000, (born in Norway,)48 reported death from consumption, or 1.1 pr. mille, of the living, while in 1874 in a population of 54,000 there was reported 70 deaths from the same cause, or 1.29 p. m. But it

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is to be remarked 1st, that to the 6,900 deaths-of the year the cause of death is only reported in 4-5 of the number, 5,500, and 2d, that the children of Norwegian parents, when born in America (they number, 33,000 in 1873,) are counted as Americans. As most of them have not yet reached the age where consumption begins to be more frequent, they would, if they were counted with their parents, increase the number of that nationality, without proportionally increasing its number of deaths from consumption. If we had these numbers, to compare with Norway, we must beside the above consider, 3d. that the cities, which have the greatest proportion of consumptives contribute less to the emigration, and 4th. that there are probably less consumptives among the emigrated, than among those remaining at home. It seems reasonable, that principally the healthy, ablebodied individuals emigrate to try their chances, while no persons, who are evidently consumptives, will venture upon the journey and seek an uncertain fortune. Next come the sick and dependant, when they have friends and family to go to.

The calculation for a comparison with Norway would be too complicated to give any reliable results even if we had the approximate figures.

More may be expected from trying to compare the different nations in regard to the proportion, in which they suffer from consumption here in Minnesota.

The number of deaths in the column of native Americans is supposed to have been largely increased by consumptives removing here from other States for their health.

By counting the American born children of the foreign population, that is the part which furnishes the smallest proportion of consumptives, in other columns, those of native Americans, and especially of natives of Minnesota, this column goes to show a proportionately small number of consumptives, while the foreign population shows a far greater proportion than would have been the case, if the whole family had been counted in. As each nationality has been estimated in the same way, the statistics would show about the right proportion between them, of the comparative frequency of the disease in question, if we only had enough of it for a series of years and reliable.

The following table will show how the different principal nationalities stand in this respect.

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NATIONALITY.	Population May 1, 1875.	Death from Consumption in 1874.	Proportion of death to 1,000 living (pro mille.)	No. after 1874.	Summ'y of deaths from consuption in 1872, 3 and 4.	P. M. in 3 years.	No. after 3 years.
Minnesota	206,000	93	0.45	1	203	0.99	1
Other U. S.	171,000	243	1.42	7	737	4.34	7
Germany	60,000	68	1.13	3	170	2.83	3
Norway	54,000	70	1.29	6	155	2.87	4
Sweden	31,000	28	0.90	2	73	2.35	2
Ireland	23,000	41	1.78	8	120	5.22	8
British America Province	20,000	24	1.20	5	56	2.95	5
England	7,000	8	1.14	4	27	3.86	6

If we, instead of comparing the number of deaths in 1874 with the number of that nationality in May, 1875, will compare with the same population the aggregate deaths in the course of three years, we get the last columns. The correctness of the last proportion depends on a supposition, which is not true, that the gradual proportional increase in population has in the named period, been the same for each nationality. But, as it is only Ireland, which is much outside of the common rate of increase, and the place of that country in both accounts is the same, and that very decidedly, these columns may help to increase the probability of the results of the one year's observation.

CONCLUSION.

If we can draw any conclusion from so few and uncertain observations, it must be in noticing the fact, that the number of consumptives among the immigrants from each nation is in this table smaller, the more of an inland clime the native country of that nation is, and becomes larger, the more the climate gets to be a coast clime, the more different it is from that of Minnesota. It is certainly so, that phthisis is a disease principally of the sea-coasts and low lands, but it is not likely that there is in the European countries in question, as great a difference in the proportion of consumptives, as there is here among their emigrants. We would draw the conclusion, that the individuals of the different nationalities are more apt here in America to get consumption, in proportion, as they are unaccustomed to that kind of a climate; if it should not, on the other hand, be the case, that the countries named are troubled with consumption in the same degree, as there here are consumptives of their nationality.

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Sweden then, has the smallest number, as it, of all the countries in question, has most of an inland climate most like the American. Next comes Germany, for the greatest part comparatively an inland. It would be interesting to know, whether or not the immigrants here from the inlands, Bavaria and Austria, are more exempt, than those from the North Sea coast and northern Prussia. Ireland has most of an island climate, and by far most of consumptives.

If this holds good, we may expect to hear that the Mennonites, who are from a country of almost American climate, are less troubled with the disease than the other immigrants.

The frequency and relation of certain diseases is different in the Northwest from what it is in Norway.

1. *Typhoid fever* is frequently brought into the State by the newcomers; these are also more susceptible to contagion in epidemics of this disease, than older settlers. In Minnesota in 1874, reported 326 deaths from that cause, which in a population of 600,000 gives 0.54 pro mille of the living. In Norway in the same year has reported 2.35 pro mille, attacked 4.0 per cent. of the reported attacks of epidemics, of which 10.9 per cent. died, which is 0.256 pro mille dead from that cause. Only the most northern districts in Norway can compare with Minnesota in frequency of this disease, Tromsastift having 0.56 pro mille dead from that cause in 1874. There the great concourse of people at the fishingplaces—fiskevaer—where the fishermen in their wet dresses are densely crowded together in the shanties, surrounded by all the filth and refuse of a fishingplace, will favor the development of the disease, which subsequently is spread in the country with the returning fishermen. But this alone does probably not explain the existing great frequency of this disease. There north it is not alone far more frequent, but epidemics move with a far greater rapidity than they do in the southern part of Norway, and here especially than they do in the more elevated places (medical statistics for Norway, 1874). The Medical Observer gives as a reason, that the disease is especially one of the coast and lowlands, and consequently more frequent farther north, where the country is not inhabited at any greater elevation from the sea, except by the Fins. Among them the Observer has not met with the disease for the 19 years he has lived in their neighborhood, although they are otherwise susceptible to infectious diseases. Perhaps the reason for this immunity of the Fins is rather the entirely out doors life they live. They have no houses, only tents, summer and winter. The question of the cause of the immunity of the Fins will be decided by inquiry into the relation of typhoid fever to the Indians, who live an outdoor

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life like the Fins in the same country, where the white settlers suffer much from it. Dr. V. Smith of Duluth, familiar with Indians, states that this disease is not known among them at Lake Superior.

2. *Acute Bronchitis* and catarrh are, in Norway, the most common of the epidemic diseases, 38.4 per cent. of all the epidemic cases treated.

In Minnesota acute bronchitis is not very frequent, but the epidemic catarrh, influenza, is the most common disease of the Northwest.

3. *Pneumonia*, which in Norway in 1874 gives 8.8 per cent. of the epidemic disease, and of which 15 per cent. of the treated died, is reported here in the Northwest seldom met with, and not very fatal. "It is generally weak, old or drinking individuals, who die from pneumonia."

4. *Chronic Morbus Bright ii,* (Brights disease of the kidneys,) not uncommon in Norway, is here very seldom observed, and commonly referred to cold; wet, or abuse of alcoholica. The acute form is not uncommon after sacarlatina.

5. *Granular conjuntivitis,* in Norway seldom met with, is here frequent everywhere. It seems principally, if not exclusively to spread by contagion, which especially has an opportunity to act, when many people are crowded together, for instance in the harvest. The transfer of the contagium is frequently effected by many using the same towel. (Dr. Ole Bull granular conjunctivits, Chicago 1875.) It may be, that the high winds of the prairies, carrying with them dust of the soil in summer when it is dry, and in winter after the snow has blown off, has a bearing on the frequency of this disease.

6. *Spedalskhed* (Elphantiasis grecorum.) Although immigration does not seem to have any influence on the individuals, affected by spedalskhed, at least no curative effect as some of them have got worse, since they came to this country, and in some cases the disease first broke out years after their arrival here, it seems as if the next and following generations will be exempt from this disease. Several of the spedalske have children and grandchildren, born in this country, but in none of them has, as far as known, the disease been observed. In Norway also the disease is decreasing. The number of known spedalske in the whole country was in 1856, 2,113, while there at the end of 1864 only were 1,832 known cases, a reduction of 181, of which 72 are known to have been healed. In 1874 there died 282 spedalske, of which number that disease was put down as cause of death for 135 individuals.

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7. *Bronchocele, struma,* is here in the northwest not uncommon. In Norway this disease is only exceptionally met with.

For a comparison and for future attention is here added a table, showing the diseases which caused the greatest number of deaths in Norway in 1874, and some others whose occurrence there is different from its occurrence in Minnesota. There is also in the last two columns put down the figures corresponding, which the statistics of Minnesota under the same heading for the same year contains:

In Norway is, in 32,499 deaths, the cause of death only reported by physicians for 13,522 cases or 43.5 p. c., while in Minnesota in 6,909 deaths the cause is reported in 55,03 cases, or 79.8 p. c.

CAUSES OF DEATHS.	NORWAY.		MINNESOTA.	
	Number.	Per cent. of all reported cases.	Per cent. of all reported cases.	Number.
Phthisis pulmonum	1,969	14.6	11.7	562
Pneumonia	1,359	10.1	4.6	258
Meningitis M. tubercula and convulsiones infantum	1,046	7.7	6.1	339
Debilitas senilis	701	5.2	3.3	191
Bronchitis acuta	605	4.5	.....	.....
Cancer	568	4.2	1.2	66
Morbilli	463	3.4	0.7	38
Diarrhoea and choleramorbus	462	3.4	11.4	626
Febris typhoides, 422-3.0 p. c.	459	3.4	5.7	326
F. typhosa escanthematica, 37-0.3 p. c.			.....	.....
Hydrops, 236-1.8 p. c.	421	3.1	.....	.....
Morbus brightii, 185-1.4 p, c.			.....	.....
Apoplexia cerebri	367	2.7	0.7	37
Vitia organica cordis	344	2.5	2.5	140
Bronchitis chronica	294	2.2	.....	.....
Scarlatina	290	2.1	4.2	233
Angina membranacea	274	2.0	1.2	87
Febris peurperalis	245	1.8	0.3	16
Peritonitis	220	1.6	0.4	22
Tussis convulsiva	208	1.5	2.9	150
Diptheria	197	1.5	4.3	236
Enteritis	122	0.9	1.9	107
Erysipelas	82	0.6	0.6	31
Paralysis	39	0.3	1.1	59
Dysenteria	37	0.3	2.5	136
Hydrocephalus	25	0.2	1.5	71
Cerebro spinal meningitis epedemica	12	0.1	1.1	58
Pleuritis	79	0.6	0.1	5

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Of bronchitis, chronic and acute for the year 1874, reported in Minnesota only 65 deaths, or 1.2 p. c., while in Norway for both together was reported 899 deaths, or 6.7 p. c. of all reported causes.

Almost half of the population in Minnesota consists of Germans and Scandinavians with their children, and for the other half chiefly of Americans, and a less considerable number of former British subjects.

In this mixed population we find, if the above figures are reliable and if they will conform with observations for longer time, that the diseases, which here are more frequent than in Norway, are:

1. Diseases of the alimentary canal, as diarrhœa, dysentery and enteritis.

2. Some of the zymotic diseases, as scarlatina, diphtheria, typhoid fever, cerebro-spinal meningitis, whooping cough; but measles seems to be an exception. Influenza is the most common disease at Minnesota, (Dr. Hand.)

3. Some diseases of the nervous system, paralysis, hydrocephalus: but apoplexy seems to be less frequent. Neuralgia is one of the most frequent diseases of Minnesota, (Dr. Hand.) Some other diseases seem to be less frequent than in Norway: Peritonitis and puerperal fever, pleuritis; bronchitis and pneumonia. Cancer and Bright's disease seem also to be less frequent.

The above figures are too much exposed to the influence of errors of different kinds, and of exceptional relations of a single year, to be reliable. It is only possible with the help of statistics for many years with any certainty to point out the diathesis, this climate and the conditions of this country develope, and to demonstrate the changes for each nation.

THE PRESENT CONDITIONS OF THE NORWEGIAN IMMIGRANT.

Looking at the *external conditions* of the Norwegians in Minnesota, it is evident that they have come from a country that has taught them hardiness and industrious habits.

Most of them are farmers here—whether sailors or mechanics they like to be land-owners. As all their exertions tend to get land, and more of it, the price of the land in and around the Norwegian settlements rises. As their neighbors of other nations frequently find it to their account to sell out to them, the Norwegian settlements commonly enlarge.

First the settlers put all their might to bringing as much land under the plow as possible, while they frequently live in poor shanties or cellars. As soon as they are able they build good barns and

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granaries, and at last a substantial living house. The household affairs as a consequence of the better economical situation soon get to be better than most of them were accustomed to in Norway, with more order and cleanliness. But they are lacking skill in selecting and dressing the victuals; they have as a rule not yet learned how to properly utilize the abundance of good material which is at their disposal.

As all can read and almost all can write, their first care is to have their children well instructed, so they, if they should lose all their worldly goods, may have left what, according to the proverb, is the most pleasant and the lightest burden to carry, knowledge. Many of the young of both sexes frequent higher schools and colleges, of which the Norwegians have founded several.

In regard to the external habitus of the people, the peculiarity that first presents itself, is that they, sometime after their arrival, lose their plump and ruddy appearance, and as a result of climate and diet, become lean and of a dryer and darker complexion.

The young, rising generation is more quickly developed than in Norway. They reach puberity sooner, are sooner married, and increase consequently in number probably quicker than in the old home. They are taller and slimmer than the old stock, the chest is not so broad, the features are more delicate, and are said already to assume a type perceptibly different from the Norwegian. It is unanimously asserted by the elder, that the rising generation is not so strong in regard to bodily exertion, as the old stock, of which the cause possibly may be in part, that they are not obliged to work so hard, and are not accustomed to it.

The Norwegians in America learn soon to take interest in American language and American affairs. They are soon americanized, so there probably, in a few years will be no external difference between the Norwegian and the other Americans. As there are among the Immigrants very few of the more educated classes, with their conservative tendencies, this americanizing process takes place so rapidly, that several of their outer distinctions, which ought to be kept, are thrown away. As we, without separating ourselves from other Americans, wish to keep, what reminds us of our origin, as for instance names, local or personal, that we may not disappear without a trace, in the ocean of people, so it would also be interesting to the Americans, both for the sake of their descent, and in conformance with their cosmopolitan character, to get their supply of names thus enriched, by ours. It would be a pleasant variation, sometimes among those endless numbers of biblical and classical names to hear some of the common germanic root, of which the national norse names, the Norwegians carry with them, affords a splendid selection. As some of them are the same, and most of them similar, to those of the old Anglo-Saxons, they would be a reminiscence of old times, and call to memory the connection between the Anglo-Saxons and their near Northern relations on the other side of the North sea.

CH. GRONVALD.

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REPORT

ON THE

METEOROLOGY OF MINNESOTA,

FOR THE YEARS

1875-76 & 1876-77.

BY

WILLIAM H. LEONARD, M. D.

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METEOROLOGY OF MINNESOTA.

MINNEAPOLIS, Nov., 1877.

To the Minnesota State Board of Health:

GENTLEMEN:—The meteorological work so well commenced and completed for 1875 and 1876, by Dr. A. E. Senkler, has been continued and summarised, as seen in the following tables.

These tables give the monthly and annual means for each station of observation, also the annual temperature and humidity for the State.

The tabular means of the seasons from Nov. 1875 to Nov. 1877, are added to this year's report, and also the highest and lowest temperature and humidity of each month for the different stations except Breckenridge, having recently received, by request only, the means from that point.

The data for this report has been kindly furnished by the gentleman who took charge of the instrument, supported by the board under the direction of Dr. Senkles. They deserve great credit for the faithful execution of their part of this work.

The following is a list of their names and stations:

S. Marlatt, Esq., at St. Cloud.

Dr. Franklin Staples, at Winona.

Dr. Solomon Blood, at Owatonna.

Dr. W. H. Pratt, at Stillwater.

Also I have been kindly supplied readings by Wm. Cheney, Esq., of Minneapolis, many years the meteorological observer for the Smithsonian Institute. Sergeant I. C. Barnes in charge of U. S. A. Signal Station at St. Paul; Sergeant H. Bessant in charge at Duluth; and Sergeant B. C. Anderson in charge at Breckenridge.

We now have observations from nine stations within the station. I hope to extend the field of observation by including Dakota and such other points as will add to our meteorological statistics.

W. H. LEONARD.

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TABULAR VIEW OF MEANS.

	1875. NOVEMB.		1875. DECEMB.		1876. JAN'Y.		1876. FEB'Y.		1876. MARCH.		1876. APRIL.		1876. MAY.		1876. JUNE.		1876. JULY.		1876. AUGUST.		1876. SEPT.		1876. OCTOBER			
	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Annual Mean Temperature.	Annual Mean Humidity.
St. Cloud	23.48	70.49	22.02	70.71	12.48	60.85	12.02	64.97	21.01	29 da 66.05	42.56	59.12	58.57	60.78	64.85	64.83	72.15	63.26	69.38	67.63	56.41	70.99	43.12	63.80	41.5	65.28
St. Paul.....	25.19	68.48	25.49	78.09	16.59	74.02	17.40	73.30	24.30	72.80	43.93	56.58	59.16	58.99	66.27	65.09	73.46	24 days 65.30	69.90	24 days 71.80	56.80	75.90	43.20	64.80	43.47	68.67
Duluth	23 80	70.70	24.70	71.40	15.10	65.10	12.20	68.90	20.80	69.10	38.40	63.10	48.70	65.20	55.10	72.00	64.90	70.00	65.50	71.00	43.50	70.00	41.70	65.00	37.86	68.45
Minneapolis...	22.52	67.73	22.66	79.03	13.58	72.13	14.57	69.61	21.56	71.20	42.63	62.50	58.03	62.65	64.44	70.64	72.70	71.21	69.53	75.87	56.86	84.46	44.43	72.78	41.95	71.65
Winona	26.96	1st to 15th 60.44	27.89	.....	19.22	54.17	25 days 19.97	16 days 62.50	23.86	71.54	26 days 44.26	58.35	24 days 60.38	61.45	27 days 68.69	68.90	28 days 78 15	62.45	17 days 75.04	69.72	59.61	77.16	46.68	61.76	45.89	63.67
St. Peter.....	26.37	71.74	25.75	78.03	16.74	76.58	18.68	71.35	23.48	71.81	45.79	64.48	59.89	64.53	67.02	69.75	74.54	68.21	74.63	75.66	57.98	79.78	43.41	70.36	44.52	71 85
Owatonna.....	24.81	59.32	24.19	66.98	14.93	58.64	18.08	58.85	20.91	28 da 63.24	42.23	62.64	57.86	64.08	63.89	69.76	71.32	70.20	68.39	74.69	56.32	74.85	42.50	60.89	41.28	65.34
Average of the Month. means	24.73	66.77	24.67	74.04	15.52	65.92	16.13	67.07	22 70	69.39	42.83	60.97	57.51	62.52	64.32	68.71	72.46	67.23	70.34	72.34	55.25	76 16	43.58	65.58	42.50	68.05

Annual mean temperature, 42.50

Annual mean humidity, 68.06 per cent. of saturation.

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TABULAR VIEW OF MEANS.

	1876. NOVEMB.		1876. DECEMB.		1877. JAN'Y.		1877. FEB'Y.		1877. MARCH.		1877. APRIL.		1877. MAY.		1877. JUNE.		1877. JULY.		1877. AUGUST.		1877. SEPT.		1877. OCTOBER		Annual Mean	
	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Annual Mean Temperature.	Annual Mean Humidity.
St. Cloud	27.13	64.11	4.73	57.60	8.68	66.13	27.65	72.83	21.12	65.55	46.45	62.09	60.91	57.90	62.46	64.70	71.93	65.74	70.05	62.19	62.66	77.80	40 95	70.15	42.06	65.55
St. Paul	29.47	29.66	8.40	69.50	10.00	71.80	32.00	72.30	23.70	71.10	46.20	55.10	62.00	52.00	63.70	63.70	73.60	62.10	72.20	55.80	64.00	66.6	46.72	70.6	45.20	61.73
Duluth	31.3	75.00	10.0	61.0	11.80	71.00	32.20	72.00	22.60	70.00	40.3	65.00	50.7	68.00	56.6	73.00	68.1	70.00	69.2	65.3	59.1	73.3	45.5	76.7	41.08	70.02
Minneapolis	.....	.....	4.12	58.96	4.12	64.55	29.94	70.63	21.43	61.92	44.50	55.42	60.01	60.02	61.92	71.55	71.72	67.74	70.09	64.38	62.00	71.3	42.6	76.6	42.95	65.73
Winona	31.39	62.65	6.46	35.13	9.96	35.69	33.06	48.12	24.22	53.73	47.64	64.08	66.05	58.12	67.18	66.91	78.01	69.09	72.21	63.57	17 days 65.79	66.69	47.24	46.51	45.76	55.85
St. Peter	31.41	71.76	7.90	66.30	6.34	66.59	32.17	76.70	24.06	75.43	46.24	67.50	51.89	66.32	63.15	64.41	74.81	73 24	72.47	65.50	65.66	72.54	46.06	44.11	44.35	67.53
Owatonna	27.07	66.82	6.79	45.43	6.90	47.39	29.58	65.46	22.87	56.57	44 66	57.84	58.73	57.91	58.59	68.88	72.62	68.01	62.65	63.00	62.6	66.8	46.01	46.51	41.58	64.21
Stillwater	.....	.....	20 days 6.56	85.92	13.31	81.79	31.15	87.12	21.39	45.37	45.56	62.60	61.44	62.03	15 days 59.05	65.34	70.69	66.74	63.19	63.37	64.90	66.86	47.83	69.94	53.19	68.83
Breckenridge	18.74	71.82	0.12	66.70	0.92	65.8	21.5	66.8	15.2	76.5	40.5	67.9	58.4	64.1	58 9	83.3	69.5	71.1	65.9	71.2	58.5	69.9	41.9	72.8	37.50	70.66
Average of the Monthly means	28.07	63.11	6.23	60.67	8.00	63.41	29.91	70.21	21.84	64.01	44.67	61.95	58.90	60.71	61.28	69.08	72.33	68.19	68.66	63.81	72.80	70.19	44.92	62.67	.....	.....

Annual mean temperature, 43.73.
Annual mean humidity, 66.67.

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ST. CLOUD, 1875 AND 1876.

	Highest Temperature.	Lowest Temperature.	Highest Humidity.	Lowest Humidity.
November	54	0	48	—0
December	48	—16	47	—17
January	41	—18	35	—15
February	42	—19	35	—19.5
March	42.5	—19	40	—19.5
April	69	28	58	23
May	85.5	37	70	32
June	88	40	78	40
July	92	55	80	50
August	88	53	78	48
September	74	30	65	33
October	67	23	57	21

ST. CLOUD, 1876 AND 1877.

November	59	— 9	54	—11
December	39	—26	36	—26.5
January	39	—20	35	—20.5
February	47	— 4	43	— 5
March	49	—13	47	—14
April	65	11	56	10
May	77	40	67	37
June	84	46	69	40
July	89	57	83	53
August	89	55	80	52
September	86	44	76	40
October	65	31	55	28

ST. PAUL, 1875 AND 1876.

November	54.5	—19.5	46	—20
December	46	—14	45	—14
January	42	—9	37	—25
February	44	—15	40	—15.5
March	44	—5.5	42.5	—6.5
April	69.5	—27	57	—25
May	85	35	71	33
June	88	40	78.5	39
July	92	59	78	55
August	86	50	76	51
September	76	36	67	33
October	73	24	54	22

ST. PAUL, 1876 AND 1877.

November	59	4	51	2
December	39	—23	85	—23.5
January	42	—20	38	—20.5
February	51	7	45	6
March	—	—	—	—
April	—	—	—	—
May	—	—	—	—
June	—	—	—	—
July	—	—	—	—
August	—	—	—	—
September	—	—	—	—
October	—	—	—	—

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DULUTH, 1875 AND 1876.

	Highest Temperature.	Lowest Temperature.	Highest Humidity.	Lowest Humidity.
November	46	— 8	42	— 9
December	42	— 9	41	—10
January	45	—12	36	—10
February	40	—15	36	—11
March	39	— 5	35	— 5
April	63	15	50	13
May	84	30	64	26
June	85	39	73	37
July	86	50	75	47
August	86	51	73	39
September	73	37	63	34
October	63	26	52	24

DULUTH, 1876 AND 1877.

November	——	——	——	——
December	——	——	——	——
January	46	—16	40	—16.5
February	55	5	48	4
March	44	— 3	40	— 3.5
April	62	9	48	8
May	74	37	62	32
June	76	42	67	39
July	89	54	76	52
August	——	——	——	——
September	——	——	——	——
October	69	31	——	——

MINNEAPOLIS, 1875 AND 1876.

November	56	—22	46	—23
December	52	—20	44	—21
January	43	—20	37	—21
February	48	—22	34	—23
March	45	—10	40	—11
April	74	23	57	22
May	88	34	70	33
June	89	43	77	41
July	94	58	79	56
August	——	——	——	——
September	——	——	——	——
October	——	——	——	——

MINNEAPOLIS, 1876 AND 1877.

November	——	——	——	——
December	42	—27	38	—28
January	45	—24	38	—25
February	52	5	44	4
March	63	— 8	52	— 9
April	73	12	60	10
May	83	36	68	34
June	83	39	72	36
July	91	57	82	53
August	87	53	81	51
September	91	43	73	39
October	70	30	65	28

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WINONA, 1875 AND 1876.

	Highest Temperature.	Lowest Temperature.	Highest Humidity.	Lowest Humidity.
November	53	—18	45	20
December	55	—14	—	—
January	43	—11	40	— 9
February	52	—15	43	—19
March	50	— 2	47	— 3
April	65	28	59	26
May	85.5	41	78.5	35
June	88.5	40.5	78.5	40.5
July	96	63	83.5	53
August	89.5	60	83.5	50.5
September	81	39	70	36
October	73.5	26	59	21

WINONA, 1876 AND 1877.

November	60	4	51	0
December	45	—24	40	—27
January	45	—22	37	—26
February	55	12	46	7.5
March	47	0	44	— 4
April	78	19	68	15
May	89	35	73	31
June	87	46	79	41
July	98	60	84	55
August	94	57	78	54
September	90	45	77	40
October	69	34	60	31.5

ST. PETER, 1876 AND 1877.

November	64	— 5	54.5	— 2
December	45	—21	39	—22
January	41	—21	39	—23
February	56	5	50	4
March	58	— 9	57	—10
April	75	13	62	14
May	84	38	71	35
June	90	38	79	37
July	97	58	89	54
August	89	54	75	52
September	92	44	73	41
October	70	28	57	26

ST. PETER, 1875 AND 1876.

November	60	—12	45.5	—13.5
December	50.5	—11	49	—11.5
January	44.5	—15	39	—16
February	51	—13	44	—14
March	47	—17	46	—18
April	72	—26	59	24
May	87	34	73	32
June	94	42	79	42
July	93	61	80	56
August	90	46	77	45
September	76	36	69	35
October	69	24	56	23

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OWATONNA, 1875 AND 1876.

	Highest Temperature.	Lowest Temperature.	Highest Humidity.	Lowest Humidity.
November	55	—17	48	—19
December	50	—17.5	48	—18
January	39	—16	37	—17
February	46	—12	45	—13
March	54.5	—13	41	—16
April	74	24	65	21
May	87	35	71	32
June	88	41	78	39
July	90.5	54	80	47
August	88	50	78	44.5
September	75	36	64	35
October	72.5	21	60.5	18

OWATONNA, 1876 AND 1877.

November	58	— 6	50	— 7
December	42	—27	37	—29
January	39	—25	34	—24
February	51	4	43	1
March	54	—14	51	—16
April	73.5	12	66	9
May	81	38	64	34
June	82	42	77	41
July	93	57	81	52
August	89	50	79	53
September	90	41	75	38
October	66	30	58	25

STILLWATER, 1876 AND 1877.

December	50	—16	50	—16
January	42	—21	39	—20
February	53	7	50	7
March	67	1	65	1
April	63	21	54	19
May	79	40	72	33
June	76	42	70	38
July	91	41	84	53
August	87	57	78	53
September	85	52	83	50
October	72	33	64	31

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Tabular View of Means of Seasons.

	SPRING OF 1875.		SUMMER OF 1875.		AUTUMN OF 1875.		WINTER OF 1875 AND 1876.	
	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.
St. Cloud	40.40	58.02	65.74	69.13	39.87	73.40	15.50	65.51
St. Paul	.....	.....	68.00	67.49	41.40	70.35	19.82	73.47
Duluth	.....	.....	62.49	64.63	39.83	69.73	17.33	68.46
Minneapolis	.....	.....	66.07	74.22	40.15	73.53	16.93	73.59
Winona	.....	.....	71.79	66.68	43.03	68.33	22.36	58.33
St. Peter	.....	.....	67.38	74.12	42.96	74.31	20.39	75.32
Owatonna	.....	.....	.....	.....	41.01	64.23	19.06	61.49

Tabular View of Means of Seasons.

	SPRING OF 1876.		SUMMER OF 1876.		AUTUMN OF 1876.		WINTER OF 1876 AND 1877.	
	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.
St. Cloud	40.71	61.98	68.12	65.24	56.41	66.13	13.68	65.52
St. Paul	42.46	62.79	69.87	67.39	43.32	56.78	16.80	71.20
Duluth	32.63	65.80	58.50	71.00	38.83	70.00	18.00	68.00
Minneapolis	40.74	65.45	68.89	72.57	50.64	78.62	12.72	64.71
Winona	42.83	63.74	73.96	67.02	45.89	67.19	16.49	39.64
St. Peter	43.05	66.94	72.06	71.20	44.26	73.96	15.47	69.86
Owatonna	40.33	63.32	66.20	71.55	41.96	67.52	12.75	52.76
Stillwater	.....	.....	.....	.....	.....	.....	17.00	84.94
Breckenridge	.....	.....	.....	.....	.....	.....	7.51	66.43

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Tabular View of Means of Seasons.

	SPRING OF 1877.		SUMMER OF 1877.		AUTUMN OF 1877.	
	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.
St. Cloud	42.82	61.84	68.14	64.21	51.78	73.97
St. Paul	43.96	59.40	69.83	60.53	55.36	68.65
Duluth	37.86	67.66	64.63	69.43	59.10	73.30
Minneapolis	41.48	59.12	67.91	67.89	52.30	73.95
Winona	44.47	58.64	72.46	66.52	56.51	56.61
St. Peter	40.73	69.75	70.14	67.71	55.86	60.81
Owatonna	42.08	57.44	64.62	66.63	54.30	56.65
Stillwater	42.79	56.59	64.31	65.15	56.36	68.40
Breckenridge	38.03	69.05	64.60	75.20	50.20	66.66

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THE SANITARY WATER SURVEY OF THE STATE.

REPORT OF THE WORK FOR 1877,

IN THE

RED RIVER VALLEY.

BY THE SECRETARY OF THE BOARD.

THE CHEMICAL ANALYSIS OF FOURTEEN SPECIMENS OF WATER FROM THAT DISTRICT.

BY

S. F. PECKHAM, STATE CHEMIST.

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THE SANITARY WATER SURVEY OF THE STATE.

According to the plan laid out some years ago, our study of the water supply for 1877 was limited to that of the Red River Valley, on the northwestern border of the State. At the request of this Board the Regents of the University ordered the co-operation of the State geological survey in the work, and so the Secretary of the Board had the company and assistance of the State geologist and chemist, Professors Winchell and Peckham. The waters mutually selected for analysis have been examined by Prof. Peckham, and his report is hereto appended. The expenses of all but one of these analyses was divided between this Board and the geological survey. Attention is called to the fact that the water of the Bois de Sioux was the purest water found, the Otter Tail next, and the Red River itself third. All good drinking water. The composition of the well water varieds exceedingly as will be seen, and no satisfactory explanation has been reached by the chemist of its frequent bad taste and odor. It is believed that he is right in calling for further analysis, and the Board will attempt during the coming season to carry on the investigation. Meantime we can only repeat the advice given in the article on water, 4th Annual Report, 1876.

"Line all wells with cement from two feet above the ground down "to the water supply if possible. Cement pipes are now used for this "purpose in several towns of the State. When well made and with "tight joints, they are the most perfect lining to be obtained. If "brick are used, they should be of the hard burned variety, and "enveloped in cement before and behind; otherwise the subsoil "water, filtering through the brick, crowds off the inner layer of "cement, and so gets access to the interior of the well. Ordinary "brick, in stone laid alone, or with common mortar, are no protec- "tion against the danger referred to, and wooden curbing is worse "than useless. Several wells, with barrel curbing of flooring boards, "have been examined, which have caved in from this cause. It is to be "hoped that the cement pipes can be supplied so cheaply as to take

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"the place of all others for dug wells. *In all cases, whatever may be "used as a lining,* it should be thoroughly puddled on the outside with "clay or cement. The drive well often affords a good water in gravel "or clay soil if deep enough to escape surface in subsoil drainage, (*i. e.* "water near enough to the surface to be affected by the surface water "of the locality."

The artesian or bored well, lined with iron pipe, and generally very deep, as a rule affords a good, hard water, but—as in the well at Campbell,—surface water may get into it, passing to the bottom along the outside of the pipe. "Zinc lined or galvanized pipes are sometimes used for drive wells. In several analyses of water from such wells, zinc has been found in solution. Zinc should be avoided in all water used for drinking purposes.

The Board reiterate the conclusions of that paper as a whole.

As a rule the river water of the Red River Valley is the best for domestic use. When cisterns can be properly constructed the Board advise their use, in preference to the average well for domestic water supply, especially if there is any suspicion of the well water. So far as organic impurity is concerned, that water may be purified by boiling, or better still, by filtering it through a good depth, (at least 4 inches,) of animal charcoal. Such a filter, with sand grave and animal charcoal is easily made by any one, and will wear for a long time without change. All that is necessary to clean it is to wash the sand, charcoal and gravel, and expose them, *dry,* for a few days, to the air and sunshine. They are then fit to use again.

The report of Prof. Peckham on the hotel water at Breckenridge, was received by the Secretary of the Board Jan. 8, 1878, too late to be incorporated with the other report. It is given by itself immediately following the general chemical analysis:

Dr. C. N. Hewitt,

My Dear Sir—I have the pleasure of submitting the following report of the examination that I have just concluded, of the specimens of water collected on our trip through the Red River Valley. They were gathered from the following named localities:

No. 1. The flowing well at Tintah, St. P. & P. R. R.
" 2. St. Gabrielle Springs, near Campbell, "
" 3. Well at Campbell Station, "
" 4. Otter Tail River, at Breckenridge, "
" 5. Bois du Sioux, " " "
" 6. Well at Conelley's, on river, 4 miles northwest of Breckenridge.
" 7. Wild Rice River, west of Fort Abercrombie.
" 8. Well at Nolan's Hotel, McCauleyville.
" 9. " " Brewery, Moorhead, (Artesian).

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No. 10. " " Bramble House, Moorhead, (surface).
" 11. " " Glyndon, good—in general use.
" 12. " " " bad, McLellen's.
" 13. Town Well at Breckenridge.

They were selected for the following reasons:

No. 1 was from a well that was dug only a few feet into the level prairie, which furnishes a stream of water constantly flowing over its brink. The water of this well is considered of fair quality, and is used at several of the stations on the St. P. & P. R. R. in that vicinity. It was therefore thought best to examine it.

No. 2 is from St. Gabrielle Springs about 2½ miles from Campbell Station on the St. P. & P. R. R., situated on the banks of a small stream called Rabbit River. These springs are the only natural outlet for water in that part of the country so far as could be learned.

No. 3 from the well at Campbell Station was represented as being very bad, and quite unlike either Nos. 1 or 2. As this well was quite deep and in the immediate neighborhood of 1 and 2 it was thought desirable to know in what respects they differred.

No. 4 is considered by the inhabitants to be the best water in the upper Red River Valley, and with No. 5 is extensively used along the banks of the two rivers. As these two waters in mingling form the Red River, it was thought desirable to ascertain their quality and their differences, if such existed.

No. 6 was selected because there was reason to believe that it was the river water filtered through beds of gravel which formed the river bottom at that point. It was thought desirable to know if such filtration removed mineral matter from the water.

No. 7, from a tributary of the Red River has a bad reputation. It was thought advisable to compare this water with that of the Otter Tail.

No. 8 appeared to be bad from excess of mineral matter, and at the same time it was different from the well at Breckenridge. For that reason it was thought best to examine it.

No. 9 was selected as representing the water of a very deep well, and No. 10 as representing the water of a shallow well from the same locality, that had been recently dug. It was thought best to compare them.

Nos. 11 and 12 were from two wells very near together and very unlike, one being considered very good and the other very poor. It was thought best to compare these and ascertain if possible why the water in the bad well should have become sulphurous.

No. 13 was the town well at Breckenridge. When selected it was supposed to represent the bad well water of that locality. It was probably much worse than the average.

The accompanying table gives the results of the examination of these specimens. In estimating the total mineral and organic constituents. 100 c. c. was evaporated over a water bath and when dry the residue was heated to 130 deg. C. in an air bath. It was then cooled and weighed, and the amount calculated as "total solid residue." This residue was then heated over a Bunsen's lamp and the

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organic matter burned off. The residue remaining was calculated as the mineral matter in solution and the difference as volatile and organic matter. This difference can not be safely computed as organic matter excepting in those cases when the mineral ingredients existed chiefly in the form of bi-carbonates. Sulphates in some instances and chlorides in nearly all, retain water at 130 deg. C. and when the amount of such salts is comparatively large, they prevent the complete combustion of the organic matter by fusing and enclosing particles of carbon. No. 13 may be noticed as an example of this difficulty. The organic and volatile matter estimated from difference is 91.412 of which only 22.298 grains is actually organic matter.

The soap test was then employed to determine the total hardness, permanent hardness, and by difference the removable hardness. Also the sulphuric acid, lime and magnesium. This test gave satisfactory results on all of the specimens but one. In No. 11 the permanent hardness was greater than the total hardness; that is, the water was harder after boiling than it was before. The tests were repeated until no doubt could be entertained of the fact. I cannot explain this anomalous result. For SO. the soap test appears to give very satisfactory results, but for lime and magnesia the processes as described are highly empirical and give results of but little or no value except when applied to water containing those bases as carbonates and which at the same time is free from alkaline sulphates and chlorides. Waters containing the last named salts are rendered harder by them. If then the total hardness is used as a basis for the estimation of the lime, it is obvious on a moment's reflection, that if, as advised by Parke, the total hardness in tenths of a cubic centimeter be divided by four and a drop of ammonium oxalate solution added for every four degrees of hardness in a carbonated water, the same rule appliedto a water containing alkaline chlorides or sulphates would cause an addition of an excess of the precipitant which adds to the hardness. For this reason I found it impossible to estimate the lime by the soap solution in Nos. 7, 9, 11 and 12. I have but little confidence in the results given for the other numbers. The magnesia was still worse for the entire hardness produced by alkaline chlorides or sulphates is included in the magnesia by Parke's method, as neither chlorine or sulphuric acid in combination with the alkalies is precipitated either by boiling or by ammonium oxalate. I have therefore omitted the estimates of magnesia in all cases as in those in which the determination was made, I had no reason to believe the figures reliable. The chlorine was estimated by a standard solution of silver nitrate, verified in No. 13 by precipitation and weighing; in which case the results corresponded to one one-hundredth of a grain.

We have reliable data therefore for comparing the waters in reference to the amount of mineral matter in solution, the total and permanent hardness, the sulphuric acid and the chlorine.

A comparison of the different specimens shows a range of amounts of mineral matter in solution varying from 6.304 grains to 390.158 grains in a gallon.

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Numbers 13 and 8 are properly termed mineral waters. Numbers 1, 2, 3, 10, 11 and 12 are very hard well and spring waters; numbers 6, 7, and 9 are ordinary hard waters, while num- bers 4 and 5 are quite pure river waters when we consider that they flow from and over sedimentary formations.

Numbers 4 and 5 are quite free from sulphates and chlorides. It will be further observed in reference to the remainder that with the exception of number 13 the sulphates are not extremely large, while again excepting number 13 the chlorides are very large, especially in numbers 7, 8, 10, 11 and 12. These results are unexpected, and I am especially surprised to obtain unmistakeable evidence that the water of the Bois du Sioux river is purer than that of the Otter Tail—in fact is the purest in the valley. A remarkable difference is also observed between the water of these rivers and that of the well at Conelley's. The mineral matter has increased about four fold, the chlorine seven fold, and the sulphuric acid three fold. These facts imply that the well water cannot be simply the river water, filtered through the gravel of the river bank.

So far as these results bear upon the subject of our inquiry they show that the waters of the Red River Valley do not contain large amounts of sulphuric acid, but that they are heavily charged with chlorides, probably largely combined with lime and magnesia. As a consequence they produce very hygroscopic residues when evaporated, and the accurate determination of the total solid residue or mineral constituents becomes extremely difficult if not impossible. An examination of the table shows that in every specimen in which the chlorine is large the organic and volatile matter is also large. This is not on account of an excess of organic matter but because the latter item is estimated by loss, and the loss consists of water retained at 130 deg. C., and also of a part of the chlorine from the decomposed magnesium chloride.

I cannot venture an opinion based upon these results, as to the cause of the water of many wells becoming fetid on standing, or when the well is used but little or not at all. Number 11, is a colorless, odorless water, used by the entire population of Glyndon. Number 12, is from a well but a few rods distant from number 11. It is of a yellowish color, contains a black sediment, and is heavily charged with sulphuretted hydrogen gas. Examination has thus far proved them to be of the same general character, with no difference in any respect that can be regarded as important. If the solution of this question is deemed desirable, I should recommend the selection of a number of typical specimens and their complete analysis, for organic, as well as mineral constituents. I should also advise a microscopic examination by an expert if possible. I would reccommend as preliminary to the selection of these specimens, a further exploration of the valley, and an examination by the soap test, and for chlorine, of a large number of waters particularly those from springs, and if possible from wells that are free from exposure to filtration of surface drainage, and filth filtered from sink drains, barn yards, and the streets of towns.

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As an illustration of the difficulties attending the drawing of any conclusions from the results thus far obtained, number 9, may be mentioned. The permanent hardness is less than in any other specimen, indicating an absence of magnesium, sulphate and chloride. There was no calcium and magnesium chloride in the residue. Therefore, no water was retained at 130 deg. C. The 9.147 grains of ganic and volatile matter is doubtless organic matter, and is a comparatively large quantity. The source of this organic matter it is impossible to determine, unless its character be ascertained. The water smelled as if contaminated with sewage from a sink, and may contain the soakage from the Brewery in which it is situated, or the organic matter may be derived from the clay. The bad well at Glyndon is near a barn, and the surface around it was covered with kitchen slops, when the specimen was obtained. The residue from the water had a decided odor of urine. The question whether these organic contaminations are derived from the subsoil or from surface filtration, becomes therefore a fundamental consideration, with reference to the prevention or cure of the undoubted bad qualities of most of the water examined. The amount of calcium bi-carbonate is not large in these specimens of water, while chlorides are abundant. It would not therefore be advisable to recomend the use of Clark's lime process.

An examinaaion showed the clay to contain a large amount of organic matter. No other result could have been expected.

Respectfully submitted,
S. F. PECKHAM.
State Chemist.

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Number.	Total Mineral Matter.	Organic and Volatile.	Total Residue at 130° C.	Removable Hardness.	Permanent Hardness.	Total Hardness.	Chlorine.	Sulphuric Acid (SO_3)	Lime (Ca O.)	REMARKS.
1	53.119	5.078	58.197	2.081	8.026	10.507	13.075	2.568	2.098	Colorless, odorless, had deposited iron.
2	62.458	12.316	74.764	10.216	15.468	25.684	10.623	4.202	6.647	" " " "
3	55.454	12.841	68.295	8.756	11.960	20.722	No estimate.	5.370	6.864	Turbid, odor of putrid brine; iron.
4	8.279	4.142	12.421	.584	5.545	6.129	1.400	1.467	2.000	Colorless, odorless, had deposited iron.
5	6.304	5.137	11.441	3.210	4.086	7.296	1.400	.700	2.654	Yellowish, odorless.
6	26.617	3.210	29.827	3.210	7.880	11.090	10.098	3.502	2.980	Colorless, odorless.
7	33.156	11.440	44.596	0.000	8.436	8.436	28.077	0.000	No estimate.	Odor and taste swampy, yellowish.
8	196.656	34.556	231.222	43.779	20.430	64.209	42.728	(?)	6.864	Musty, dirty yellow, much iron.
9	31.968	9.147	41.135	12.550	1.167	13.717	9.746	2.334	No estimate.	Colorless, odor like a sink drain, deposit like clay.
10	48.967	43.662	93.629	9.340	6.712	16.052	156.204	2.334	2.918	Colorless, odor marshy, deposit like clay.
11	41.736	17.628	59.364	(?)	20.038	13.133	46.289	1.467	No estimate.	Colorless, odorless, deposit of iron.
12	49.675	20.488	70.163	3.502	5.837	9.339	56.096	2.200	No estimate.	Yellow, odor of H_2S, deposit black.
13	390.158	90.412	481.570	No estimate.	No estimate.	No estimate.	1.061	174.241	45.658	Residue on evaporation had the appearance and odor of a urine residue.

	Total Mineral Matter.	Water, etc. retained at 130° C.	Organic Matter.	Total Residue at 130° C.	Residue in $BaSO_4$.	Insoluble, H Cl SiO_3.	Fe_2O_3 and Al_2O_3.	SO_3.	Cl.	Fe_2O_3, Al_2O_3 and $Fe_2P_2O_8$.	Ca O.	Mg O.
13	390.158	69.114	22.298	481.570	57.542	4.412	3.035	174.241	1.061	10.723	45.658	29.443

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Dr. C. N. Hewitt.

MY DEAR SIR:—The following is a report of the examination of the hotel water at Breckenridge, procured through Mr. Ulmer, agent of St. Paul & P. R. R. at East Minneapolis. If it was taken from the well that I directed it to be taken from, it came from the well in the rear of the hotel nearest the river on the north side of the main street. I examined it in the same way that I examined the other specimens last summer. The results were as follows :

Total solid matter in solution	86.024	grains per gallon.	
" organic " "	12.286	" "	
" mineral " "	73.756	" "	
" hardness	19.843	" "	$CaCO_3$
Permanent hardness	8.756	" "	
Removeable "	11.387	" "	
Sulphuric acid (SO_3) in solution	1.868	" "	
Chloride (Cl) "	17.395	" "	

This shows quite a different water from the town well, but still it is very hard, much harder than what is usually considered hard water. It resembles the other waters in the valley inasmuch as it contains but little sulphuric acid in proportion to the chlorine persent.

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CHEMICAL ANALYSIS

OF SAMPLES OF

ENAMELED IRON WARE

WITH REFERENCE TO THEIR

DOMESTIC USE,

BY

PROF. S. F. PECKHAM, STATE CHEMIST.

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ANALYSIS OF ENAMELED IRON WARE.

There has been so much dispute as to the safety of the domestic use of the various kinds of enamel used upon vessels of iron, that the following report from the State Chemist was asked, and it is herewith presented. The investigation was made to answer inquiries addressed to the State Board of Health by citizens of the State, and the conclusions of the professor have been given to the newspapers of the State for popular information. Should it be necessary the inquiry will be continued during the coming summer.

The practical conclusion from the professor's examination is that "marbleized iron ware" should not be used, that "granite iron ware" should not be used for cooking fruits, or pickles, or any acid thing; and, that "agate iron ware" may be safely used for all domestic purposes, to which it is adapted.

MY DEAR DOCTOR:—In conformity with your instructions I have canvassed the market in this city and St. Paul with reference to the enameled ware sold under the name of granite ware and other trade names. I found the "Granite Iron Ware" made by the St. Louis Stamping Company" to be the ware most largely sold both at wholesale and retail. Mr. Adam Decker of St. Paul, had "Agate Iron" made by LaLance and Grosjean of New York City. A plate labeled "Marbleized Iron" was procured of Mr. Decker, which he said was the last of an old stock, manufactured also by La Lance and Grosjean.

These specimens that were examined were 9 inch pie plates, the the granite ware purchashed of Messrs. Strong, Hackett & Chapin of St. Paul, and the agate ware of Mr. Adam Decker, also of St. Paul. A small kettle of granite ware purchased of Messrs. Janney, Moles, Brooks & Co. of this city, was also examined.

The strongest chemically pure hydrochloric acid was boiled in the kettle to dryness, and the residue dissolved in water and a few drops of hydrochloric acid. Sulphuretted hydrogen gas was passed through the solution and an abundant precipitate of orange sulphide of antimony was obtained.

The pie plates were subjected to the following tests by boiling in them the following named solutions. The same solutions were boiled at the same time in a plate of each kind—granite and agate—for about half an hour and a saturated solution of sulphuretted hydrogen added in excess; the tests being as nearly identical as possible.

No. I. 2 grammes pure tartaric acid and 100 c. c. water.

No. II. 20 c. c. glacial acetic acid and 100 c. c. water.

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No. III. 2 grammes pure citric acid and 100 c. c. water.

No. IV. 2 grammes pure oxalic acid and 100 c. c. water.

No. V. About 20 c. c. of strong, pure nitric acid was evaporated to dryness in the ptates, the residue dissolved in water and a few drops of hydrochloric acid added.

No. VI. Cold concentrated hydrochloric acid, pure, was left standing in plate No. V. for 48 hours, and poured off and diluted.

No. VII. Hydrochloric acid was boiled in plate No. VI.

The seven tests all showed that antimony was dissolved from the "granite iron ware" excepting No. V., which did not give any reaction with sulphuretted hydrogen. Nos. I. and III. gave a perceptible coloration, from the orange precipitate. No. II. gave only a trace, No. IV. gave at a rough estimate two-thirds as much precipitate as No. VII. Nos. VI. and VII. gave an abundant precipitate of the orange sulphide.

When applied to the "agate iron" the I., II. and IV. tests gave a trace of precipitate that appeared to be tin. There was not enough of the precipitate to give a definite reaction for tin, but the color of the precipitate would indicate that metal. No. III. gave scarcely a trace. No. V. did not give any precipitate. No. VI. and VII. did not give any precipitate with sulphuretted hodrogen but reacted for iron with ammonia.

No. II. gave with the "marbleized iron" a heavy precipitate of lead, coloring the solution as black as ink. No other tests were applied to this specimen.

Dr. Odling, who is the highest English authority, and is as good as any other, gives lead, copper, arsenic, antimony and mercury as the poisonous metals, which with their compounds should always be sought after in cases of suspected poisoning. I made a strong, but not very strong, solution of these vegetable acids, and they all dissolved more or less antimony from the "granite iron ware." The five metals mentioned above are all precipitated by sulphuretted hydrogen in an acid solution. The test applied was therefore sufficient as whatever else was dissolved was not a matter of importance.

The trace of metallic matter dissolved from the "agate iron" was so slight in amount, as to show an almost completely insoluble enamel, that under the severe tests to which it was subjected shows itself to be decidedly superior to the "granite iron ware" for general household uses. While for a large majority of household uses the "granite iron ware" would be perfectly harmless, it cannot be denied that the great majority of fruits, both green and ripe, as well as all kinds of pickles ought not to be put into these vessels at all. Garden rhubarb, currants, sour apples, green gooseberries, cranberries; tomatoes, etc., are as strongly acid as the solutions that I made, at least to the taste, and some or all of these, are cooked often in every family. They all contain some or all of the vegetable acids used, and these acids all acted on the "granite iron ware," while they did not act perceptibly on the "agate iron." I should therefore say that while the "granite iron ware" is safe for *most* purposes, the "agate iron" is safe for *all* purposes to which it is likely to be applied in households.

Very truly yours,

S. F. PECKHAM.

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THE RELATIONS OF SCHOLASTIC METHODS

TO THE

HEALTH OF PUPILS,

IN THE

PUBLIC SCHOOLS.

A PRELIMINARY INQUIRY INTO THE SUBJECT.

BY THE SECRETARY OF THE BOARD.

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HEALTH OF PUPILS IN THE PUBLIC SCHOOLS.

Herewith are submitted the replies received to a series of questions addressed to some of the leading teachers of this State, and also to the President of the University of Wisconsin, by the Secretary of this Board.

As they came to hand it was thought advisable to secure the vital statistics of the schools concerned. By the kindness of the physicians, who collected them, they have been made as extensive and accurate as the limited time would permit. Both the replies and the statistics, indicate very clearly the necessity for the further careful collection of the facts, of the influence of our scholastic methods upon the health of scholars. They demonstrate that the teachers of our State are keenly alive to this neccessity and anxious to assist in every way possible. It is gratifying also to note that the replies received show a disposition not to prejudge, some of the matters under discussion, but to await a more careful and searching investigation than has hitherto been made.

Encouraged by this feeling, and the promise of hearty co-operation, from teochers and physicians this Board will, as soon as possible, prepare and distribute to such schools as will use them, suitable tests for hearing, sight, weight, height, chest capacity, etc. with directions for use, with them will also be sent a form of blanks for the record of these and other vital and health statistics of pupils.

The Board of Regents of the Univcrsity, at the suggestion of the secretary of this Board, have ordered the collection and record of such statistics for every student entering the university, and that such record be revised once a year during attendance there.

If this example is followed in the schools of higher grade throughout the State, there will be secured a collection of reliable data—trustworthy facts—such as can be obtained in no other way. The effort will be made in the common schools so far as the co-operation of county superintendents shall be given. It is proposed also to obtain information as to the construction and furnishing of

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existing school-houses and rooms—their lighting, ventilation and warming; the form and location of school desks and seats, and their relation to light; the effect of text books in use, as respects size, type, print, and illustration, as also of the color, location, and use of blackboards and crayons, on sight.

Inquiry will be made as to the number of hours devoted to study, recitation, and recreation, during school time; the system of rating excellence in school; the use and influence of competition and rewards upon scholars; as also of methods of examinations, vacations, and the practicability of half time schools.

The subject of co-education of the sexes will be studied in the light of these statistics, the testimony of teachers, and the observations of medical men. The evidence of parents of pupils, and of graduates of either sex, of such schools will be asked for.

The vital statistics of schools for one sex alone, and the evidence of their teachers and medical attendants will be sought for, that the fullest scope may be given to the inquiry. In beginning this work this Board rely upon the hearty aid of teachers and the medical profession. To the latter they must look for the collection of vital and health statistics chiefly, their professional skill and observation are necessary to the accuracy and thoroughness of the work.

CONDENSED ABSTRACT OF REPLIES RECEIVED TO QUESTIONS PROPOSED TO TEACHERS.

No one whose reply is here given had sufficient time for careful elaboration of the answers to the questions proposed. The replies for that reason fairly exhibit current opinion upon the subjects to which they relate.

Taking the questions in their order, the answers received may be summed up as follows, reference always being had for details to the replies themselves, which are appended to this paper in the order of their quotation:

1st question:

Comparative health of girls and boys on entering school?

In the Universities—Wisconsin, "about the same." Minnesota, "boys supposed to be better." Carleton College, "not so good."

In the Normal Schools—Winona, "as a rule, girls in good health." Mankato, "No difference." St. Cloud, "Not so good."

In the City Schools—St. Paul "no difference." Minneapolis, "favorable." Red Wing, "Not so good and is less in the higher grades."

In the Common Schools—Superintendent of Public Instruction, reports "no great difference."

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Institution for Deaf, Dumb and Blind—"No difference observed."

The uncertainty evident in the replies is due 1st, to the absence of any recognized standard of health either for boys or girls, or common to both sexes, and 2nd, to the absence of any record of vital or health statistics.

The rule of requiring a record of vital and health statistics upon entering school and a correction of that record for every subsequent year of school attendance, will alone give accurate answers to this question. It is hoped that this rule will be general hereafter in at least the higher schools. The advantage to pupil and teacher alike of such knowledge will amply repay the trouble of the record. It has happened to the writer to know that defects in sight and hearing have been greatly aggravated, after the entering school because of the ignorance of the teacher of these defects, on the part of the pupil, and of the pupil's effort to use them at a distance of which they were incapable. There is no doubt that serious disease has resulted in many cases from such ignorance. A slight but accurate test of the sight or hearing would have prevented it.

2nd question.

Average scholarship of girls and boys compared?

In the Universities—Wisconsin, "girls better." Minnesota, "girls probably higher." Prof. Peckham gives statistics of relative standing, claiming "girls to be, in every respect, the equal of boys in his department." Carleton College, statistics of five years carefully collected give the girls the highest standing in every class of the college.

In the Normal Schools—Winona, "girls 10 per cent. higher." Mankato, "no difference." St. Cloud, "girls as good, probably better than boys."

In the City Schools—St. Paul, "girls may average higher." High School, "girls better." Minneapolis, "on the whole girls better than boys." Red Wing, "uniformly better, statistics prove it."

In Common Schools—No difference under 12 years of age.

Institiution for Deaf, Dumb and Blind—"Statistics give girls from one to two tenths better standing.

As the standard is a settled one, common to both sexes, and relative standing is a matter of record, there is less uncertainty in the answers to this question.

It is to be noticed that when ever the statistics are given the standing of girls is always equal to, and as a rule higher than that of boys. See the statistics given by President Strong, of Carleton College, Prof. Peckham of the University, and Prof. Whitman of the Red Wing schools.

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In a recent paper presented to the New York Academy of Science. Prof. Peckham instances a young lady student of the University, as "the most accurate and skillful manipulator in analytic chemistry he ever had under his instruction."

3rd. question:

Do those girls who are best in scholarship fall below other girls in health?

In the Universities—Wisconsin, "No." Minnesota, "No." Carelton College, "Doubtful."

In the Normal Schools—Winona, "As a rule not the most robust." Mankato, "No." St. Cloud, "Not likely to."

In City Schools—St. Paul Supt, "No; think better." High School staff, "To some extent, yes; because of harder study and greater mental exertion." Minneapolis, "Probably, yes." Red Wing, "Emphatically, no."

In Common Schools—Supt. Pub. Instruction, "Good scholarship in both sexes, associated with nervous temperament, somewhat at expense of muscular development."

Institution for Deaf and Dumb and Blind—"Best scholars enjoy best health.

Here again the absence of a common standard of health and of a knowledge of that of individuals, except as may appear in the ordinary performance of duty, makes a definite answer difficult. All concede that a careful observation and record of all the available facts are necessary to the answer of this question. And it is all the more necessary because the conclusion reached, will have much to do with opinion as to the healthfulness of co-education.

4th question:

Are girls absent on account of sickness more than boys?

In the Universities—Wisconsin, "Much less."—See statistics in Pres. Bascom's report. Minnesota, "Think they are." Carleton College, "Yes."

In the Normal Schools—Winona, Mankato, St. Cloud, all reply "Yes."

In the City Schools—St. Paul, "No." High School, "No." Minneapolis, "Think not." Red Wing, "Yes."

In Common Schools—State Supt. Pub. Instruction, "Not before puberty."

Institution for Deaf, Dumb, and Blind, No. Daily and weekly reports prove it,"

The statistics of the University of Wisconsin give a very decided negative to this question, and shows further that more boys than girls there, are compelled to leave college on account of ill health.

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Are no detailed statistics are available at this time in Minnesota.

The balance of opinion in the State as represented in the replies. is that girls while attending school are oftener disabled by sickness than boys. See the replies themselves for details.

As bearing upon the question of co-education, see the extracts from the Wisconsin reports.

Special attention will be paid to this subject, in the inquiries of the coming year.

5th. question.

Does the general health of girls decline as they continue in school:

In the Universities—Wisconsin, "no. Statistics to prove it." Minnesota, "Do not think it does: "Carleton College, "no more than at home."

In the Normal Schools—Winona, "It improves," Mankato, "No" St. Cloud, "Not necessarily."

In the City Schools—St. Paul Supt. "No," High School (staff) "yes as regards those highest in scholarship." Minneapolis, "I am confident that a decline in health is quite marked." Red Wing, "Not as a rule; teachers agree in this."

Common Schools—Superintendent Public Instruction, "not sooner than boys under puberty.

Institution for Deaf, Dumb, and Blind—"No." Improves as they advance in the school.

The statistics in the University of Wisconsin indicate a decided improvement as they continue in college.

The opinion of the Principals of the Normal Schools is that health does not decline, and at Winona it improves.

In the City Schools—Opinions differ and are about evenly divided.

It is evident that statistics are to necesary the decision of this question also. Medical men can give great assistance here and they will be called on for help.

6th question.

Do girls get as much physical exercise, of the proper kind, as they need while attending school?

In the Universities of Wisconsin and Minnesota. "No." Carleton college. "No."

In the Normal School—Winona and St. Cloud, "No." Mankato. "Yes."

In the City Schools—St. Paul. "Doubtful." Minneapolis. "No." Red Wing. "Lower grades, Yes. In the higher grades No."

In the Common Schools—Superintendent Public Instruction. "In county Yes. In city No."

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Institution for the Deaf, Dumb and Blind—"No."

Here is mainly unanimity of opinion and it agrees with the reported experience elsewhere. Girls do not get as much exercise of the proper kind while attending school as they ought to have. Why not, and how to remedy the evils is subject for future inquiry.

7th question.

The effect on the health of girls of study out of school or taking music, or other lessons out of school hours ?

In the University—Wisconsin. "No effect." Minnesota. "Is rather on scholarship than health." Carleton College. "Undoubtedly bad."

In the Normal Schools—Winona, Mankato and St. Cloud all report "unfavorable."

In the City Schools—St. Paul, "unfavorable." High School, (see Dr. Boardman's report). Minneapolis, "decidedly yes." Red Wing, "Yes."

In Common Schools—"Yes, attempting double work."

Institution for Deaf, Dumb and Blind—"Unfavorable."

A reference to the detailed answers in the replies will show a belief so general as to be practically unanimous that scholastic work out of school hours, is not advisable on the score either of scholarship or health. See especially Dr. Boardman's report on study out of school in St Paul High School, as also Prof. Peckham's remarks on this subject.

8th. question.

Would the separate education of girls affect the rapidity of their progress?

In the Universities—Wisconsin, "No." Minnesota, "not materially." Carleton College, "yes, unfavorably."

In the Normal Schools—Winona, "No." Mankato and St. Cloud, "Yes, unfavorably."

In the City Schools—St. Paul, "Yes, unfavorably." Minneapolis, "no advantage." Red Wing, "Yes, unfavorably."

In Common Schools—Superintendent Public Instruction, "the fault of teachers if the sexes do not as well together, as apart.

Institution for Deaf Dumb and Blind—"Yes, unfavorably."

Co-education is a fact in Minnesota in all departments of the public school system, and in Carleton College. Separate education is afforded only in schools under religious bodies. The statistics of these schools have not yet been obtained, but an effort will be made to secure them, as also the experience of the teachers conducting them. See the replies for a variety of views on this subject.

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9th. question.

In what way, in your experience are *manners* and *morals* affected by co-education.

In the Universities—Wisconsin, "No manifest effect," Minnesota "Favorably," Carleton College, "Both improved."

In the Normal Schools—Winona, "Decidedly improved" Mankato "Just as in the family" St. Cloud, "Both improved."

In the City Schools—St. Paul, and Red Wing, "with judicious teachers co-education best."

St .Paul High School—"On the whole favorable," Minneapolis, up to 15 years of age both promoted by it. In advanced education, in the interest of morals, opposed to co-education: vide Prof. Tousley's letter.

In the Common Schools—Superintendent Public Instruction, "Favorable to both, with good teachers."

Institution for Deaf, Dumb, and Blind—"Favorable to both under good teachers."

This question is ably discussed in the replies to which the reader is referred, as also to the Wisconsin reports.

As far as Minnesota is concerned co-education is favored by most of the teachers, with the proviso that teachers be capable in their vocation.

Vital and Health Statistics of Scholars—The table gives the averages of the different measurements, and of years in school, the other numbers are not averaged, as regards the spirometer measurments, see Profesors Sperry, and Thomas' note. With the now evident inaccuracy of the instrument, the spirometer records are only of value in this table, for *comparative* chest capacity. Another and accnrate instrument will be used hereafter.

The measurements with the tape are accurate, and were taken over the dress of the girls and under the coat of boys.

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QUESTIONS.

I. How does the average health of girls compare with that of boys, on entering school?

II. How does their average scholarship compare with that of boys?

III. Do these girls who are best in scholarship, fall below other girls in health?

IV. Are girls absent on account of sickness more than boys?

V. Does the general health of girls decline as they continue in school.

NI. Do girls get as much physical exercise, of the proper kind, as they need, while attending school?

VII. Does the fact of the girls studying out of school, or taking music, or other lessons, out of school hours, affect their health?

VIII. Would the separate education of the sexes affect the rapidity of their progress?

IX. In what way, in your experience, are *manners and morals* affected by co-education?

Any other fact or opinion as to co-education, not called for by above questions, which you wish to give will be acceptable.

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REPLIES TO THE QUESTIONS.

NOTE.—The replies are numbered to correspond with the questions.

University of Wisconsin—President Bascom.

I. "About the same."
II. "Girls better."
III. "No."
IV. "Much less."
V. "No." (Vide statistics collected for report to regents.)
VI. "No."
VII. "No effect."
VIII. "No."
IX. "No manifest effect."

[NOTE BY THE SECRETARY.—The following extracts from the report of the Visiting Committee, Board of Regents, University of Wisconsin; the report of the President of the Board of Regents, and the report of President Bascom give three views of the question of co-education.

They are convincing evidence of the difference of opinion among educated men as respects this subject, in a single school.

The result in Wisconsin has been to open up the discussion of the subject again. It is to be hoped that the method will be by a diligent and scientific search for facts rather than opinions.

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FROM REPORT OF BOARD OF VISITORS TO BOARD OF REGENTS UNIVERSITY OF WISCONSIN, PPS. 45, 46 AND 47.

"It is now several years since the experiment of the co-education of the sexes was begun in the University. In respect to the proficiency shown by the young women in the several classes during the recent examinations, as compared with the young men, our impressions coincide with former boards of visitors. They sustained the test at least as creditably as the young men, and, if there was a difference, we are inclined to think it was in favor of the young women. In the main, they excelled in the precision and promptitude with which they responded to questions. We were, however, deeply impressed with the appearance of ill-health which most of them presented. It would not seem probable that, by mere coincidence, so many young women should be congregated together offering this peculiarity. There are a few notable exceptions, but, as a whole, this appearance is unmistakable, and has given rise to considerable comment among the members of the board. There can be nothing about the hygienic condition of the University, in any of its parts, which would give rise to ill-health. Every part examined presented an appearance of cleanliness; the food in the Ladies Hall was wholesome and well prepared; the service rooms clean; the dormitories well lighted and aired, and of sufficient capacity. We are, therefore, compelled to look elsewhere for the cause.

Every physiologist is well aware, that at stated times, nature makes a great demand upon the energies of early womanhood, and that at these times great caution must be exercised lest injury be done—an injury which, it is well known, may prove permanent. In order to keep place in the University classes, where the sexes are educated together, no account is taken of the fact that the woman labors under a double disadvantage, as compared with the man. 1st, in the circumstance that nature compels compliance with its well established laws, and, as above stated, makes demands upon her energies: and, 2d, that to keep her class standing, the girl must devote more energy, and, consequently, work harder, to accomplish her task, making drafts upon her system, which, by the very nature of the case, is already taxed to meet the physiological demands made upon it. It is also well known that overwork, in whatever way induced, at the times indicated, will produce deterioration of the system, which generally manifests itself by bloodlessness, followed by a train of evils which it is not necessary here to enumerate. It is this very condition of bloodlessness which is so noticeable in the women of the University at this time; the sallow features, the pearly whiteness of the eye, the lack of color, the want of physical development in the majority, and an absolute expression of anæmia in very many of the women students, all indicate that demands are made upon them which they cannot meet.

Education is greatly to be desired, but it is better that the future matrons of the state should be without a University training than that it should be procured at the fearful expense of ruined health; better that the future mothers of the state should be robust, hearty,

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healthy women, than that, by over study, they entail upon their descendants the germs of disease. And there is no more certain law than that of heredity. The over-wrought nervous system undermines the general heath stealthily, but certainly, and its evil consequences are prolonged in many cases through life.

We are aware that the law organizing the Univerity provides that it shall be open for the education of men and women. It is not therefore necessary that both classes of students be subjected to the same systematic course of training, mental drill being attained in a variety of ways, each leading to adequate results; and the thought impressed itself upon some of the members of the Board that the curriculum could be so ordered that both sexes might obtain University drill—adjusted in such a manner that each sex should be enabled to secure that form of education be stfitted for his or her respective sphere—and that the system of compelling men and women to fare alike might be so modified as to preclude the possibility of causing disease. We are forced to the conviction that there is at present, a marked disparity between the health of the men and women of the University, and that, as a class, the women present undoubted evidences of physical deterioration. If the Board of Regents, however, consider it expedient to alter the curriculum in any way, we would earnestly recommend that particular attention be paid to the physical well being of the female students."

FROM REPORT OF PRESIDENT OF THE BOARD OF REGENTS, PAGE 12 AND 13.

The qnestion of perpetuating the present system of co-education in the University has been revived by the report of the board of visitors, present at the last annual examination. This report, together with the comments of the President of the University upon the same subjcct, in his annual report to the Board of Regents, is herewith submitted:

The argument of the board of visitors relates more directly to the degree of education which female students are physically enabled to acquire within a given time, than to the expediency of co-education in the abstract. We are furthermore assured, in a semi-official way, that the board of visitors do not wish to be understood as recommending a denial of any of the existing privileges of the University to any class of students, but as suggesting, simply, such modification in the courses of instruction as will render them available to female students who may prefer less exacting mental labor, and a minor degree of culture.

It is not claimed that the problem of co-education has been finally determined, in its relation to capacity for mental culture, and still less in its relation to the personal association of the sexes in our universities. Nor is this problem in either respect one which can or ought to be determined upon special data, or upon limited observation and experience, here or elsewhere. The whole civilized world is concerned in the experiment, and by the final judg-

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ment of all the parties to the controversy we shall be forced to abide.

However that may be, no doubt ought to obtain as to the duty of the University to maintain that higher standard of instruction by which alone it can claim an honest title to its proper rank and name. And if, unfortunately, there are students, or classes of students, unfitted by nature or preparatory training for that extent of progress and intellectual developement necessary to entitle them to the honors and rewards of university education, obviously their place is elsewhere.

This view is further enforced by the fact that, by the law and theory of its organization, the University occupies a specific position in the general plan of public education, with duties limited to a special plane of educational service. Between its work and that of the common school, the high school, the private school, the academy or the boarding school, there is justly no conflict or confusion of energy, and can be none while neither seeks to usurp the proper function of the other.

So far as co-education refers specifically to the personal and social relations of the sexes, however, ordinary prudence suggests a considerable degree of conservatism. While we cannot consistently lower the standard of university education, there certainly exists no obstruction to the enforcement of such rules of discipline in respect to students in attendance upon the University, as best conform to the average views of parents and guardians, and a wholesome public opinion.

FROM PRESIDENT BASCOM'S REPORT.

"One thing we profoundly regretted in the report of the Board of Visitors, and that was the opinion expressed by them as to the health of the young women. There were some passing appearances, arising from excessive studiousness of a few not naturally strong, that gave the criticism a color of truth, and were, doubtless, the grounds of conviction in the minds of the committee. These reasons, however, were very partial and by no means sufficient for the broad conclusions drawn from them; conclusions arising from exceedingly limited observation, and which did not command the assent of all the committee. We regret these opinions because they tend to open a controversy just closed, and to compel us to travel a second time over grounds already painfully trodden, and this with the prospect of no other or better issue than that already reached. To be pushed back into the water, when we have just reached shore, is trying.

The Faculty, most of whom were in the outset opposed to co-education, and who have had years of observation both as to its relation to education and to the health of young women, pronounce earnestly and unanimously in favor the maintenance of the present method.

Contrary to the opinion of the visitors, the young women do their work with less rather than with greater labor than the young men, and certainly do not fall below them in any respect as scholars. We also believe this labor to be done by them with perfect safety

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to health, nay, with advantage to health if ordinary prudence is exercised. The young women, whose health was primarily the ground of criticism, have improved in strength, rather than deteriorated, since they have been with us, though they may have burdened themselves with extra work which we do not counsel.

We confess to some surprise that so many of the medical profession bring forward for the first time in connection with co-education, a function familiar from the dawn of humam life, as if it had the force of a fresh discovery in putting down this form of progress, when, in fact, it has no more to do with co-education than with separate education, can as well be provided for in the one form of instruction as in the other, and bears with ten-fold force against the labor of women as operatives, clerks, teachers, housekeepers, in which callings continuous hard work has been allowed to pass utterly unchallenged.

Though my conviction has been, previous to this report, that the health of the young women as a whole was better than that of the young men, and that there were striking instances of graduation among the young women with robust strength, I am striving to test this opinion by facts, so far with the following results. All excuses for ill health are given by me. The exact number of students n our collegiate and dependent courses is 357. Of this number 93 are young women, a trifle more than one quarter. During the past eight weeks, the most trying weeks in the year for students, there have been 155 days of absence from ill health on the part of young men, and 18 on the part of young women. The young women should have lost according to their numbers, 54 days, or three times as much as they have actually lost. The students were not aware that any such registration was being made. It may be felt that the young men are less conscientious in pleading ill health than the young women, and this is doubtless true; but I sharply question a young man, and rarely ask any questions of a young woman. I explain the facts in this way. The young men are not accustomed to confinement, and though sun-browned and apparently robust, they do not endure the violent transition as well as women. Study is more congenial to the habits of young women, and the Visiting Committee are certainly mistaken in supposing that they have to work harder in accomplishing their tasks. The reverse is true. In addition to the above bill of ill health against the young men, a corresponding large number of them has been compelled, from the same cause, to leave the University altogether.

A second showing of the registration, which I had not contemplated, but one very interesting, is this: the absences of the young women are almost exclusively in the lower classes. Of the eighteen, two are in the sub-freshmen, fourteen in the freshmen, one in the sophomore, one in the junior and none in the senior. The absences of the young men are evenly distributed, on the other hand through the entire course. The young women do not seem to deteriorate with us in health, but quite the opposite. I do not belong to the number of those who set lightly by health.—I would not sacrifice any measure of it for scholarship; but it has long seemed to me plain, that a young woman who withdraws herself from society and

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gives herself judiciously to a college course, is far better circumstanced in reference to health than the great majority of her sex.

I repeat my thanks to the Visiting Committee for their labors, and have no doubt that even the mistakes which such boards may inadvertently make, will ultimately be productive of more knowledge and more safety.

JOHN BASCOM.
President University of Wisconsin."

FROM PRESIDENT WILLIAM W. FOLWELL, UNIVERSITY OF MINNESOTA.

MINNEAPOLIS, Nov. 15, 1877.

Dr. Chas. N. Hewitt, Secretary of the State Board of Health:

DEAR SIR:—The general health of the students of this institution has been so good that there has never appeared any occasion to make and record careful observations. The replies below are founded merely upon the impressions which eight years' experience in this place have left upon the writer, and they are offered subject to such corrections as scientific observation may at any time demand. I have little faith in any testimony upon this subject, except that which a large and careful series of observations shall furnish.

Questions not repeated, but answers numbered accordingly:

1. The health of the girls is that of young women in general, that of the boys, also of the health of the young men in general. I suppose the average health of boys of 12 and upwards to be above that of girls of same age.

2. The average scholarship of girls is probably higher than that of boys, but only a small proportion of girls advance into the upper classes. I find young women excelling in history and political economy. For instance, the last senior class graduated 13 men, 3 women. Of the six who ranked highest in political economy three were women.

3. No, the best scholars among the women are those in best health.

4. I think they are. We now keep our record so as to show the facts.

5. I do not think it does. More young women drop out of our classes in order to marry or to go into society than on account of failing health.

6. No. We have no gymnasium in which to give the proper physical culture and exercise.

7. Such extra work more frequently effects scholarship than health. Except in rare instances music and scholarship do not go well together.

8. Not materially I think. Girls have no trouble in keeping up with the average rate of progress, and few boys can advance more rapidly than that average.

9. In our experience without dormitories the students living mostly in families—the effects on manners and morals is favorable. I believe the co-education as now carried on is beneficial to both

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the sexes. I believe we have better order than separate schools can have, and that without any trouble worth mentioning.

Remark.—Co-education was not undertaken in this institution on account of any theory; it simply came about. When the institution was opened as a preparatory school in 1867, young women came in and nobody thought to send them away. They have kept coming, and for one I am ready to continue the experiment indefinitely. As a teacher I should much regret to lose from my classes the clear-headed and earnest young women who attend them.

WM. W. FOLWELL.

FROM PROFESSOR S. F. PECKHAM, UNIVERSITY OF MINNESOTA,

MINNEAPOLIS, NOV. 13TH. 1877.

DEAR SIR,—I answer your questions as follows :

1. Ans, I have no means of knowing. As a general thing they *both* come from schools of lower grade than the University—High schools and academies. I have never heard that any differences had been observed in the health of pupils at such schools that could be attributed to sex.

2. Ans. The students with whom I am brought in contact are for the most part young men and women. The average young women are the most conscientious, orderly, and faithful students. These are essential to scholarship. In every class that I teach there are young women who are in every respect of scholarship the equals of the best young men. Here are some statistics. In three classes in general chemistry.

I.	II.	III.
5 girls averaged.....69.	7 girls averaged.....78.	11 girls averaged.....76.
21 boys " .....71.	24 boys " .....77.	21 boys " .....73.

Three classes in chemistry applied to the arts.

I.	II.	III.
2 girls averaed .....78.	5 girls averaged .....80.	5 girls averaged .....72.
6 boys " .....82.	12 boys " .....79.	16 boys " .....73.

Analytical Chemistry

5 girls average.....92
8 boys " 86

This class in general and applied chemistry was led by two girls. considerably in advance of all the rest of the class. In molecular Physics 7 girls average 78, and 30 boys average 78. These classes are freshmen and sophomore.

In classes two years below in Physicial Geography, 17 girls averaged 71; 41 boys averaged 75. In Elementary National Philosophy, 9 girls averaged 72, and 37 boys averaged 68. In Elementary Physiology, 7 girls averaged 89, and 22 boys averaged 78.

The scholarship depends on *brains* and the use that is made of them, and not on sex.

3. Ans. I have no reason to think they do. I think some of our best scholars are among our best specimens of apparently healthy women.

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4. Ans. President Fobwell is collecting statistics to answer these questions officially.

5. Ans. I answer that it has appeared to me that the young women of the University, may be divided into three classes, viz.:

First, those who come here provided with sufficient means to live comfortably and who come to study. They devote their energies to their work of securing an education, paying but little attention to society. They do not appear to be injured at all, but on the contrary they often appear to improve in color and other general indications of health and vigor.

Second, those who try to do two things at once—to secure an education, and at the same time to in no way or to no extent curtail the claims of society upon them, to more or less habitually spend the evening from 7 to 11 in company, and the night from 11 to 2 in study, or an attempt at study. Such ones break down in health or scholarship, sometimes in both almost inevitably. It would not be reasonable to expect other results from human beings, either men or women. The successful young men in our colleges as a general thing, cannot stand such a regimen, and do not attempt it; and if young women under such circumstances injure their health it is not, in my opinion, because they are women, but because they wickedly misuse the gift of life and the means to health.

Third, those who are forced by necessity to divide their energies between subsistence and education; who cannot starve while they study, but must work while they study. Among them are often found those who in a fair contest would stand in the front rank the equals of any young men in general scholarship; some of them stand there in spite of circumstances, declaring it is in them to do it if they die. It is idle to ask if they suffer in health; of course they do. They wear poor clothes, subsist on poor and insufficient food, in poorly warmed and ventilated apartments. Young men do the same thing, and I see no way to help it or prevent it in either case. They are too proud to accept assistance, and they do not ask for it. The young men and women are however in one respect not equally matched. The opportunities for earning money or the means of subsistence, are much fewer for young women than young men, both in number and kind. I have been asked if I knew of *anything* that a woman could do that was not sedentary. "Young men can build houses or gather the harvest, but I have not the physical strength," they say. I cannot answer such a question, perhaps you can."

My opinion is that when large numbers of young women like young men are willing to devote several years of their lives with all of their energies to securing an education, making it the business of their lives during these years, giving up society as young men do and studying evenings instead of nights, without robbing themselves of sleep, which you very well know is fatal to young persons; when this is done I believe that it will be found that boys and girls of one mother can study together.

6. Ans. I do not think any general answer can be given to this question. Some do and some do not. The same may be said of boys.

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7. *Ans.* I don't believe it does, any more than it affects boys. Boys or girls who try to do two things at once must suffer in health or scholarship, sometimes in both. More girls take music lessons, in my opinion, than boys. The effects of overwork do not depend on sex so far as I have observed.

8. *Ans.* If I understand the question, I do not think it necessarily would.

9. *Ans.* I have been connected with two institutions in which there were both young men and women. One had dormitories, the other has not. I am entirely opposed to the dormitory system, under any and all circumstances for colleges. It may answer for boys and girls at boarding schools. I am especially opposed to the dormitory system for collegiate institutions admitting both sexes. In the University of Minnesota I have seen nothing to change the impression that I formed when I first came here; that the intercourse of young men and women here, unrestrained as it is by any artificial and unnatural attempts at regulation prompts a great deal of dignified courtesy on the part of the older and more thoughtful students of both sexes. The character and conduct of pure and earnest young women is not easily influenced by the thoughtless folly of those of either sex whom they do not fully respect, while the elevating influence of such persons over all with whom they come in contact in the natural intercourse of everyday life has never been questioned. A very large proportion of our young women are of that character. A standard of scholarship that well employs a person of average capacity is a very potent preventive of many difficulties, for on the one hand it keeps good students well employed, and on the other renders a prolonged stay in the University unpleasant or impossible to the idle and frivolous of either sex.

I made the acquaintance of co-education with strong prejudices against it, chiefly with reference to these considerations. They are rapidly disappearing. While I believe many of the barbarisms that degrade and disgrace our older colleges will lead a short and sickly life in an institution open to both sexes, I believe also that the *character* of students as determined by the scholarship maintained by the faculty, will largely determine the moral and social status of co-education. Here as elsewhere "eternal vigilance is the price of liberty."

Very truly yours,
S. F. PECKHAM.

FROM PRESIDENT JAMES W. STRONG, CARLETON COLLEGE, NORTHFIELD.

C. N. Hewitt, M. D., Secretary State Board of Health:

DEAR SIR:—The questions relating to the co-education of the sexes, submitted by you in behalf of the State Board of Health, have been considered. Premising, what you admit, that they do not cover the whole subject, but that some points of primary importance are not here discussed, we respectfully return our replies.

1. "How does the average health of girls compare with that of boys, on entering school?"

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Unfavorably. We have no statistics to prove this precise point, but as indicating, in general, the relative physical condition of the two sexes, we give you some facts gathered during the last spring term by Dr. L. B. Sperry, our Professor of Physical Science. One hundred and fifty students, of whom about one-third were ladies, were examined. A few had been in attendance for years, and some were comparative strangers. The gentlemen averaged 19.84 years of age, 5.6 feet in height, and 148 pounds in weight. The ladies averaged 18.13 years of age, 5.26 feet in height, and 133 pounds in weight. The chest capacity, as determined by Barnes, Dry Spirometer" ranged from 145 to 455 cubic inches, and averaged 285 cubic inches. Only one young lady had a chest capacity exceeding 260 cubic inches, and only one young gentleman had a capacity less than 245 inches. The average capacity of the gentlemen was 330 inches, and that of the ladies 183 inches. It is seen that in age, height or weight, the gentlemen exceed the ladies only about ten per cent., while in chest capacity they exceed them about eighty per cent. Physiologists affirm that the female pulse, (and hence her respiration) is about one seventh more rapid than the pulse of males. Adding then one seventh to the average chest capacity of the females, and we have 209 cubic inches, which still leaves the ladies about 57 per cent. behind the gentlemen, in lung power. And yet, we believe that the lady students of Carleton College, upon whom these observations were made, are not below the average young woman, in health and physicial development. These statistics do not answer the whole question as to relative health, but they are certainly significant.

2. "How does their average scholarship compare with that of boys?"

That our reply may have a substantial basis in fact, and not be a mere opinion, we have examined our records for the last five years, and carefully computed the average standing in scholarship, of the different classes, in our various courses of study.

The results obtained are as follows:

In our *English Course,* which covers four years, and is not a college course at all, the gentlemen have averaged (on a standard of 100) 77 and the ladies 81.

In the *Preparatory Course,* which covers three years, the gentlemen have averaged 79, and the ladies 82. Combining these two sub-collegiate courses, the averages have been, gentlemen 78, ladies 81.

In the regular *collegiate course* of four years, the gentlemen have averaged 85, and the ladies 88.

While in the earlier departments the ladies have constituted about one third of the whole number, in this course, they have fallen to about one fifth.

Combining all the courses, the general average for the five years has been, gentlemen, 80.7, ladies 83.8. Thus it appears that in each of our departments of study,—the classical no less than the English,—the ladies have maintained the highest rank in scholarship. Perhaps it should be added that in our system of marking, 100 represents an ideally perfect standard, and is given only for *special* excellence.

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3. Do those girls who are best in scholarship fall below other girls in health?"

It is impossible to answer this question satisfactorily. Among our best female students, are some of the healthiest, and some of the feeblest,—and it is equally true that among our poorest scholars, we find both extremes as to physicial health. The true relations of cause and effect are not easily determined. Doubtless it is often the case that those girls (and also those boys,) who make the most marked intellectual progress, sacrifice to some extent, their physical vigor. It seems equally apparent that among our girls, there is more frequently poor scholarship because of poor health, than poor health because of excessive mental work.

4. "Are girls absent on account of sickness, more than boys?"

Yes, though not for sicknesses to which boys are equally liable.

5. "Does the general health of girls decline as they continue in school?"

Not more than as a rule, the health of our American girls declines at home, subjected to its ordinary labors and the demands of society. Our experience in this institution is brief,—covering only a decade of years, but it has given us the conviction that, the regularity of habits, healthful diet, early and abundant sleep, pleasant associations and ennobling ambitions, which here may be enjoyed, more than counterbalance all the injurious influences resulting simply from the sedentary life and mental strain, to which they may be subjected; and that our girls leave us in better physical condition than they would have secured during the same time, under the labors and influences of the majority of homes represented.

In several cases it has been true that the beginning of the fall term has found our girls in a much poorer physical condition, than was theirs at the close of the academic year in June. The severe labors incident to home life, had prevented the rest and the recreation, which the long summer vacation ought to secure, and for physical reasons, if for no others, they have needed to return to their studies.

6. "Do girls get as much physical exercise of the proper kind, as they need while attending school?"

No; nor do they when out of school. If our girls could be dressed with as much reference to health and comfort, as are the boys,—and if instead of doing their own sewing and laundry work, they could spend in open air recreation, the time usually consumed by indoor labor, we believe as large a proportion of them, as of the other sex could take without injury, courses of study fully equal to those now pursued by the boys.

7. "Does the fact of girls studying out of school, in taking music or other lessons out of school hours affect their health?"

Undoubtedly it does. A well arranged course of study ought to comprise all the mental drill that is healthful for the average girl; and as a rule, all study outside, must be excess.

8. "Would the separate education of the sexes affect their progress."

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In our judgment separate education is not so favorable to the intellectual progress, or the symmeterical mental development of either sex. Co-education affords to each a mental stimulus of real value; but we by no means affirm that both sexes should pursue precisely the same course of study.

9. "In what way, in your opinion are manners and morals affected by co-education?"

Under wise regulations and proper oversight, both are improved. Co-education in the higher institutions certainly necessitates on the part of instructors, special care and discretion; but where these are wisely exercised, there will be a manifest culture both in manners and morals. The peculiar difficulties are not insuperable, and they are much more than balanced by the peculiar advaatages.

It may be added that in these opinions, substantially as expressed, our Faculty are quite agreed.

Very truly yours,
JAS. W. STRONG,
President Carleton College.

FROM PROF. CHARLES A. MOREY, PRINCIPAL STATE NORMAL SCHOOL, AT WINONA.

Dr. C. N. Hewitt,

DEAR SIR:—Your questions are received. I have given the subject considerable thought, and have had the opportunity of comparing results. I answer your questions according to my conclusions:

1. Four fifths of our candidates are girls. As a rule they are in good health. We discourage all others from entering the school, as the first element of a successful teacher is strong vitality, and personal magnetism, which can come only of perfect health. This fact destroys the force of the comparison.

2. The average scholarship of the girls is higher than that of the young men by at least 10 per cent.

3. As a rule the best scholars are not the most *robust*; but in my experience they have been strong, FINELY ORGANIZED, *healthy* girls, whose hereditary and other advantages have been good.

4. Girls are absent on account of sickness more than boys; but by their superior acumen, and application they soon make up the loss.

5. Our girls are in better health when they leave than when they enter.

6. We give *all pupils* the same drill in physical exercises. Girls are not so apt to receive its full benefits as the boys.

7. Such outside work, would, as a rule, be detrimental. Free schools give pupils too little work.

8. I think not. Granting that less work should be done by girls at the time of their menses, and that their work should be therefore periodic, I do not think it follows that it is best to separate them from the boys.

9. Morals and manners are decidedly improved by association, provided the grinding influences are good.

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I am glad you are taking hold of this subject. It needs more *sunlight*, and less illumination from single *candles*. It takes more than one swallow to make a summer, and more than one person's observations to establish a theory.

Yours truly,

CHAS. A. MOREY.

FROM D. C. JOHN, PRINCIPAL STATE NORMAL SCHOOL AT MANKATO

C. N. Hewitt, M. D., Secretary State Board of Health.

DEAR SIR:—I have the honor of replying to your inquiries as follows:

I. I have observed no difference in the health of the sexes on entering school.

II. No difference in their average scholarship.

III. No.

IV. Yes; girls are more frequently absent for short periods, but upon the whole they do not lose any more time. They are more liable to colds, headache, neuralgia, &c., than boys, but I think the liability arises more from inferiority in clothing than difference in sex.

V. No. A few are obliged to leave school on account of declining health, but they were confirmed invalids at the time of entrance. On the other hand many have steadily improved in health while in school. Study is not incompatible with good health, and a pale face is not necessarily a sign of culture.

VI. Ours do: most of them board themselves, others walk a long distance to secure good boarding places. Very few of our girls get too little exercise, and many get entirely too much.

VII. We exact all the labor from our pupils they can perform. If any one takes outside lessons she must either overtax herself or neglect some of her regular studies.

VIII. I think the separate education of the sexes tends to retard their progress, because it lacks the stimulus of emulation. Boys do not like to be beaten by girls, and girls take great pride in showing their mental equality with the historic (?) lords of creation.

IX. Just as it affects their manners and morals in the family. It is just as reasonable to turn Hindu and separate our sons and daughters in the family, as it is to separate them in the school room, and it produces precisely the same effect upon their character. Separation tends neither to social culture, grace, nor purity; on the contrary it renders pupils careless in dress and manners and often disorderly in conduct. Neither side is so sensitive to the good opinion of its own sex as to that of the opposite; and hence this reciprocal restraint is entirely lost. If boys and girls live together in the family, if they are destined to a life companionship after they leave school, it seems to me difficult to find a valid objection to their co-education. Of course undue intimacy should not and need not be tolerated; but where a proper interest in study is awakened, no danger need be apprehended from this source.

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I think it would be well if your board would issue a pamphlet on the ventilation of school buildings, giving plans for buildings of all grades, and then ask the legislature to enact a law imposing a severe penalty upon school officers who fail to profit by the information furnished them.

Respectfully,

D. C. JOHN.

FROM PROF. D. L. KIEHLE, STATE NORMAL SCHOOL, AT ST. CLOUD.

Dr. Chas. N. Hewitt,

DEAR SIR—Your favor of the 14th ult. came duly to hand. I reply as follows:

1. The average health of girls is not as good as that of the boys. It is here about as you see throughout the country.
2. The scholarship of girls is as good, *probably better* than that of the boys.
3. The best scholars are not likely to be the poorest in health.
4. Girls are out oftener on account of sickness than boys.
5. Their health does not necessarily decline toward the close of the term. Sickness is often caused by imprudence and exposure rather than by study. Of course students grow tired as the term progresses.
6. Girls do not get as much physical exercise as the boys. They need more, unless they have long walks to and from school, which is generally the case here.
7. There is not much extra work done out of school; as a rule it is not profitable.
8. In this school there is a preponderance of girls. This, together with the thorough discipline of the school, and the staid disposition of our students makes it the best arrangement to be desired.
9. The manners and morals are improved by the plan of co-education in the school. Where the female element is so largely represented the general atmosphere of the school is more like that of home.

I will say also that the arrangement of our hours for study and recitation are very favorable to the health of students. We are in school six days from 8½ a. m. to 12½. Study hours are from 3 to 5 p. m., and 7 to 9 in the evening. This plan has proven to be a success, and has given us these advantages;

1. Our work is well distributed through the day.
2. We have daylight for study—many students have weak eyes.
3. We have warm dinners.
4. A little work every day of the six has been better than to do all in five, and have two holidays.

Allow me to suggest that the students would be greatly profited by some practical hints as to how to eat; how to bathe; how to use their eyes. We shall be glad to learn the result of your study of this important problem of health and education of the sexes.

Yours truly,

D. L. KIEHLE.

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FROM PROF. L. M. BURRINGTON, SUPERINTENDENT OF SCHOOLS, ST. PAUL.

ST. PAUL, MINN, Nov. 14, 1877.

Dr. Chas. N. Hewitt, Secretary State Board of Health.

DEAR SIR:—Your favor of Nov. 12th, with the accompanying list of questions is before me.

It will be impossible for me to give exhaustive answers to all of your questions, if to any, since the causes of irregularity in attendance of pupils are in many cases beyond the range of our most careful scrutiny. I have consulted to some extent my records for the past three years, and from the results of this examination I will endeavor to give approximate answers. In addition to this if you should require more carefully prepared statistics, I shall be happy to furnish them at some future time.

I. I am not aware that there is any marked difference in the health of boys and girls where they enter school.

II. My judgment is that in the earlier years of school life the girls may average higher than the boys. Although in some classes the contra is the fact.

III. I am not aware that those who excel in scholarship are inferior in health. Indeed I am confident it is the reverse of this.

IV. No.

V. No; unless from influences outside the school.

VI. Perhaps not. Our accommodations are very limited for such exercise.

VII. It depends upon the time given to music. They have sufficient to do without music.

VIII. I would not favor separate schools. My impression is both sexes would be injured by the separation.

IX. Morals and manners depend almost entirely on the teacher. The judicious teacher will accomplish more in a mixed school than in one of either sex.

Respectfully yours,
L. M. BURRINGTON, Superintendnet.

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FROM DR. C. H. BOARDMAN FOR HIMSELF AND AS THE COLLECTIVE OPINION OF THE STAFF OF TEACHERS IN THE ST. PAUL HIGH SCHOOL.

Query. No. 1.

Answer. There is probably no material difference; individuals of of either sex fall below the standard, and possibly this may be true of rather more girls than boys. It is a fact which has some bearing upon certain of the subsequent questions as well as upon this, that a number of the girls are not unacquainted with manual labor at home, and some of these suffer from overwork, as do others from anxiety due to straitened circumstances, and from kindred influences.

No. 2.

Answer.—Better.

No. 3.

Answer.—To some extent, yes; as might be expected from harder study and greater mental exertion.

No. 4.

Answer.—No.

No. 5.

Answer.—Yes, as regards those highest in scholarship.

No. 6.

Answer.—No.

No. 7.

Answer.—Apparently not.

No. 8.

Answer.—Upon this point there exists some difference of opinion among the staff of the school. Assuming that mental progress is referred to in the question, I think it may fairly be said, that in general there would be no great difference whether the sexes were educated apart or together. In individual cases two opposite results might appear. A certain number whose attention is now diverted by the presence of the other sex would make better recitations under a different system, and, on the other hand, there may be those who would retrograde somewhat on the withdrawal of the stimulus of rivalry. The number of each of these, however, is probably small.

No. 9.

Answer.—On the whole, favorably. It will, of course, be understood that some of these replies are in great measure conjectural; actual experiment alone can supply accurate information. They are, in the main the collective opinion of the teachers of the school, but do not, as a whole, represent the views of any one of the staff. It will also be apparent that nothing short of a house to house visitation, and conferences with the parents of the pupils can enable us to pronounce opinions upon some of the points herein discussed that shall have the weight of strong probability, if not of certainty.

C. H. BOARDMAN.

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FROM PROF. O. V. TOUSLEY, SUPERINTENDENT MINNEAPOLIS PUBLIC SCHOOLS.

1st question.

Answer.—From my experience in two latitudes, widely differing, I have concluded, that the health of girls compares favorably with that of boys.

2d Question.

Answer.—The scholarship of girls, on the whole, is better than that of boys.

3d question.

Answer.—I am not prepared to answer this question from a close observation of facts. My *impression* is, that the health of the former, will show an unfavorable contrast with that of the latter.

4th question.

Answer.—I do not think that they are.

5th question.

Answer.—I am confident that a decline in health is quite marked.

6th questoin.

Answer.—They do not.

7th question.

Answer.—It does most decidedly. The change of dress from 12 to 15 years, and the demands of what are called "accomplishments" will largely explain this decline in health.

8th question

Answer.—I do not believe that such separation would insure greater progress.

9th question.

Answer.—The 9th question involves many considerations, which you may not care to hear. But speaking as the representative of common school education, where nine-tenths of the pupils, with whom I have had to do, are under fifteen years of age. I believe that good manners and sound morals are best promoted through co-education. Dr. Mary P. Jacobi, in the New England Journal of Education of Dec. 13th, 1877, speaking on this subject, says, "During the neutral period of children, girls and boys should be educated together, because the sex does not, properly speaking, exist. During the period of adolescence or of the formation of sex, it is well to establish a separate education, as the character of such is being defined and consolidated. This separation is needed by the moral and physical training rather than by the intellectual.

"It is desirable to prolong as late as possible, the first unconsciousness of sex. At this age, the stimulus desired from co-education, acting upon imperfect organizations, is liable to be other than intellectual—liable to excite emotions equally ridiculous and painful from their prematurity, and therefore to increase the very danger most to be averted from this period of life—the excessive development of the emotional functions and organs of the nervous system."

If the above statements have their foundation in physical causes, they carry grave import, and so far as *advanced instruction* is concerned, I should in the interest of morals, oppose co-education.

Dr. Leonard:—This, I believe, gives you what you desire. If satisfactory to you, all is well.

Respectfully,

Dec. 24th, 1877. O. V. TOUSLEY.

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FROM PROF. O. WHITMAN, SUPERINTENDENT RED WING PUBLIC SCHOOLS.

RED WING PUBLIC SCHOOLS,
SUPERINTENDENT'S OFFICE,
Dec. 1, 1877.

C. N. Hewitt, M. D., Sec. State Board of Health.

The average health of girls is less than that of boys on entering school, the difference being small in the primary grades and largest in the grammar and high schools. This increase from the lower to the higher grades is not owing to the amount of school work, but rather to facts stated in answers to subsequent questions.

I have spent some time in collecting statistics with the following result:

Average scholarship for the school year ending, June 1877.

High School.

26 Boys.....78 per cent.
39 Girls.....80 " "

Grammar Schools.

36 Boys.....78 per cent.
56 Girls.....79 " "

Intermediate Schools.

59 Boys.....74 per cent.
63 Girls.....77 " "

Primary Schools.

71 Boys.....77 per cent.
52 Girls.....78 " "

Thus it will be seen that the average scholarship of girls is uniformly better than that of boys. This is not attributable to superior abilities of the girls, but to the fact that girls attend school more regularly than boys, and are more easily interested in their studies. Boys are allowed greater freedom at home than girls; they are permitted to go out on the street to join their mates in various kinds of sport, while girls are kept in doors, and either amuse themselves with books and papers, or are busy at some kind of work. For such reasons girls like school and school work better than boys, and will outrank them in scholarship.

3. I answer the third question *no*, emphatically. Such girls may be naturally brilliant, but their ill-health affects the scholarship.

4. Yes. Girls are not so warmly clad as boys, and hence are more subject to colds and their attendant diseases. There is great need of reform in the matter of dress for girls.

5. It does not as a rule. Our teachers all agree on this.

6. Girls in the primary grades do, but those in the higher grades do not. Little girls will play as hard at recesses as the boys, but the larger ones take little if any vigorous exercise.

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7. Too much study is not only a weariness to the flesh but it is positively injurious to the health. Below the grammar grades, pupils should not be permitted to study out of school hours, and even above these grades, if teachers pursue the right course, there will not be much, if any, need of outside study of school lessons. It is not the hard but the long continued study that is injurious. It is not the length but the kind of application that masters the lesson. While attending school pupils ought not to give any attention to extra lessons. The school work is as much as they ought to do; otherwise they are overtaxed, and in time the health will give out. It is a fact worthy of note that most of such work is imposed upon girls, even those who are already in feeble health.

8. It would. The progress of both boys and girls would be less rapid. Both sexes would take much greater pride in their standing as scholars, if educated together, and emulation is oftener noticeable as existing between boys and girls, than between boys and boys, or between girls and girls. This is true in all grades.

9. By co-education, pupils become more refined, easier in their bearing in society, and more becoming in their deportment. I think it was Gough who said that a young man would never grow round shouldered, if he should meet ladies in his every day walks. There is no doubt but that the moral status of pupils is greatly elevated by co-education, provided that the proper care be exercised over them. It is natural; what God has joined in the family, let not man put asunder in the school.

A. WHITMAN,
Superintendent.

FROM HON. D. BURT, SUPERINTENDENT OF PUBLIC INSTRUCTION.

ST. PAUL, Nov. 10, 1877.

C. N. Hewitt, M. D. Secretary State Board of Health.

SIR:—It is difficult to give unqualified answers to your "questions relating to the co-education of the sexes." There are wide differences between urban and rural home life, and children under the customs of the city, especially in some families of the wealthier classes, may be physically degenerated by influences not connected with the schools or study. In the country, hot biscuit, pork and grease, and feather beds that contain too much of the *fowl*, may be the real cause of ill health that seems to originate in the school room. The domestic customs of our foreign born population differ widely from those of many American families, and result in different grades of health and types of disease. Then there is disease inherited, and disease induced by wrong personal habits. We should not attribute to proximate methods of education, what ought to be referred to such remoter agencies.

I have taught or superintended schools, city and rural, in seven different states, east, south and west, and a wide observation convinces me that most answers to inquiries like yours are the result of narrow induction, and not the average truth.

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Confining myself to our public schools, and attempting to average city and country, home born and foreign born, rich and poor, I venture the following replies.

1. As regards the comparative health of girls and boys when they first come under the influence of the schools, I have noticed no great difference. At that age the health of both sexes depends upon laws that are common to both. The physical strength of girls may be less than that of boys without implying inferior health.

2. I have noticed no greater differences between the scholarship of girls and boys under twelve years of age, than between different children of the same sex; if by scholarship you mean attainment in letters. If the term includes ability to learn, girls often succeed in some studies better than boys, and vice versa.

3. Good scholarship in both girls and boys is apt to appear in connection with a nervous development somewhat at the expense of muscular development; but there are no greater differences in this respect between bright girls and dull girls, than between bright and dull boys.

4. I have not noticed that girls before the age of sex peculiarities are absent from school more than boys, on account of illness. Some girls are often more courageous in facing cold weather than some boys, and generally their powers of endurance do not fall below those of boys.

5. The health of both girls and boys is apt to suffer from long terms and continual attendance in city schools under high pressure. I have rarely seen this in rural schools. I do not think that girls give out under severe application to study sooner than boys; that is, under the age of puberty.

6. In country life there is not often a lack of exercise in either sex; but in city life and schools, girls are not apt to take as much exercise as boys, sometimes not enough for good health, especially after they become misses.

7. Girls that undertake "music and other lessons," and at the same time attempt to do full class work in school, suffer in health for the folly of undertaking double work. It would be so with the other sex.

8. If girls and boys cannot study as effectively in the same schools as in separate schools, the fault is in the management of the school and not in sex peculiarities. I believe that a school not so managed as to be free from hindrances to progress on the plan of co-education, needs a better teacher rather than a separation of its boys and girls.

9. In schools under teachers of good morals, and the refinement necessary to teaching, I think co-education favorable to the morals and manners of both sexes. If teachers are low in morals and weak in management, and the school premises are not properly arranged, and the district not fully civilized, a great deal of corruption may exist in schools composed of both sexes. The same would probably be true in schools under such conditions, composed wholly of either sex.

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The imperfections that some are fond of seeing in certain of our public schools, result, so far as they exist, more from bad morals in parents and general society than from defects in our plan for popular education.

Were I to extend your inquiries to schools other than those of our common and graded system, and to girls in incipient and maturing womanhood, my answers would need more qualification. I have noticed that young ladies after that period are more apt to give out under long confinement in school than are young men. They take less exercise, and pernicious customs often work toward that result. The physical and the mental constitution of maturing and mature womanhood requires lines of study suited to feminine peculiarities, and different, somewhat, from those required by the other sex. I do not, however, believe in a style of "Ladies' Seminaries that make the accomplishments a specialty." Planes and sand paper must be used before varnish can be successfully applied; yet in the other extreme, there may be an excessive use of the jack plane. The regimen at Mount Holyoke as it was some years ago, was too rigorous for many young ladies. The wants of young women seem to be well met in seminaries and colleges for them exclusively; yet I see not why the two sexes, if there be courses of study proper for each, cannot meet with advantage to each, in the recitation rooms and in the well regulated social intercourse of the same institution.

Respectfully yours,

D. BURT.

FROM PROFFESOR J. L. NOYES, SUPERINTENDENT OF THE MINNESOTA INSTITUTION FOR THE EDUCATION OF THE DEAF, AND DUMB, AND THE BLIND.

FAIRBAULT, MINN. Dec. 1st. 1877.

C. N. Hewitt, M. D.

DEAR SIR:—In answer to your questions I desire to say,

1. On entering school we perceive no difference in the health of our male and female pupils.
2. In scholarship the girls are fully the equal of the boys. Our record shows from one to two tenths in favor of the girls.
3. No. The best scholars among the girls enjoy the best health.
4. They are not, i. e. the girls are not absent more than the boys on account of ill health,—our daily and weekly reports show this.
5. No; on the contrary, the general health improves as they advance in their course.
6. The girls do not exercise as much as the boys in the open air, but have a good share of indoor exercise.
7. Study out of school hours is limited to both boys and girls.
8. It would affect it unfavorably, if at all.
9. Co-education under proper government, affects both "*manners* and *morals*" favorably. It makes both sexes more modest, polite and mindful of little things, and tends to relieve the mind of youth

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of that morbid, sickly sentimental idea, in regard to the sexes, that often prevails in children and youth who are educated without this mutual reflex influence. All of my teachers here agree with me in this opiuion.

In regard to what has been expressed above concerning the health of our girls, I am happy to say, that Dr. Nichols, our physician for 15 years, fully accords in opinion with all that I have expressed.

Very truly yours,
J. L. NOYES.

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TABLE SHOWING SOME OF THE VITAL STATISTICS OF SCHOLARS IN SCHOOLS NAMED.

COMPILED BY THE SECRETARY.

NOTE.—This table is worked up from returns made by the following named gentlemen:

University—The Secretary of this Board.
Carleton College—Prof. Sperry, of the college.
Mankato Normal—Prof. Morey, Principal.
St. Cloud " —Dr. A. McDonald, St. Cloud.
St. Paul High School—Dr. C. H. Boardman, St. Paul.
" " " " —Examination of sight and hearing by Dr. Francis Atwood. St. Paul.
Winona High School—Principal.
Red Wing High School—Drs. Sweeney and Hewitt.
Deaf and Dumb Institution—Dr. W. H. Leonard, of Minneapolis.
The additional reports are appended to the table.

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NAME OF INSTITUTION.	AGE, in years.		HEIGHT, in feet.		WEIGHT, in pounds.		SPIROMETER.‡ Breathing capacity in cubic inches.		CHEST MEASURE. With tape in inches. Maxim'm		Minimum		NO. YEARS AT SCHOOL.		STUDENTS' NATIVITY. American.		STUDENTS' NATIVITY. Other than American.		PARENTS' NATIVITY. American.		PARENTS' NATIVITY. Other than American.		Percentage of defective sight, chiefly Myopia.		Hours of study out of School.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
State University—*																										
Average of College classes	23.32	20.60	5.75	5.38	150.42	120.34	390.76	253.75	36.87	32.54	33 47	29.41	3.35	2.90	55	24	3	....	46	22	13	2	15.0	29.16	....	....
" 3d and 4th class†	19.26	.....	5.80	....	138.76	.....	336.30	.....	35.52	.....	32.35	.....	0.42	....	26	...	1	....	20	...	7	....	4.0	.....	....	....
Total average	20.79	...	5.78	....	144.55	.....	363.53	.....	36.19	.....	32.91	.....	1.89	....	...	...	...	...	...	...	...	...	.....	.....	....	....
Carleton College	19.84	18.13	5.60	5.26	148	133	330	183	.....	.....	.....	.....	....	....	...	...	...	...	...	...	...	...	.....	.....	....	....
Winona Normal	19.20	17.61	5.61	5.31	141.25	127.76	.....	.....	36.80	34.32	33.85	31.88	....	....	28	58	13	37	...	...	...	...	.....	.....	....	....
St. Cloud Normal	18.69	16.68	5.63	5.24	142.51	119.33	.....	.....	35.81	33.30	.....	.....	....	....	21	69	4	....	14	58	14	11	...	.....	....	....
St. Paul High School	15.94	16.22	5.42	5.25	.....	.....	.....	.....	34.35	33.34	32.52	31.82	....	....	...	...	...	...	...	...	...	...	7.02	11.02	2.6	2.45
Winona High School	17	16.50	5.56	5.30	133.50	114	.....	.....	34.41	32.61	31.68	31.14	....	....	32	54	....	1	...	...	...	...	.....	.....	....	....
Red Wing High School	15.85	16.02	5.37	5.17	117.51	113.79	277.65	215.12	.....	.....	.....	.....	9.18	9.05	30	39	4	2	20	28	14	15	.....	.....	....	....
Deaf and Dumb Asylum	16.20	15.56	5.27	5.05	120.72	109.36	248.05	176.40	30 83	28.83	.....	.....	3.50	3.20	13	17	4	7	7	7	10	17	28.00	16	....	....

*Not all the students examined.

†No ladies in those classes examined.

‡The Spirometer used is so imperfect as to make the records only of use for comparison.

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A letter from A. Macdonald, M.D. of St. Cloud, accompanying the Vital statistics of the State Normal School at St. Cloud.

ST. CLOUD, MINN, Dec. 22nd. 1877.

C. N. Hewitt, M. D., Secretary State Board of Health,

DEAR SIR:—On Wednesday morning agreeable to your request I visited the Normal School for the purpose of making a statistical report of the students. Profesor Keihle received me with his well known urbanity, and offered every facility for the accomplishment of my task. Unfortunately for the thoroughness of the statistics which I submit, the school was in the midst of its busiest season, having just commenced the customary examination at the end of the term, preventing for the want of time, my making a more satisfactory report. There are one hundred and twelve in attendance in the Normal department, and fifty eight in the Model schools.

I found the students as a class physicially well developed, bright and intelligent, yielding scrupulous obedience to the admirable discipline of the school.

The school a large and handsome building evidently constructed with due attention to comfort and sanitary rules, is situated on a a high bank of the Mississippi River. The class rooms are large and airy with high ceilings and forming each a complete system of ventilation, which can be regulated at will. The entire building is heated by pipes supplied with steam by an engine in the basement.

The grounds, which have been much improved during the past summer under the supervision of Profesor Keihle, are large and ample for the purposes of a first class school. The Normal home, situated in the school grounds, a large and well built structure, is under the charge of Mrs. J. H. Gates, who with singular tact has suceeded in making it a very desirable home for young lady students. It is conducted on the family co-operative plan, with such success that first class board is furnished for the small sum of two dollars and twenty five cents per week.

The teaching staff of the school consists of eight, including Prof. Kiehle, Principal, and Miss Ella M. Stewart, Superintendent of model schools.

The average attendance at school is very high being 98 per cent. The pupils have been exceedingly healthy, there being but little absence from illness.

They have been free from headaches and other symptoms attendant on close and ill-ventilated rooms.

There are six working days in each week, the hours of attendance at school being from 8½ a. m. to 12½ p. m., dissimilar to the hours of attendance in most schools, but for many reasons very desirable.

In the first place the week's work instead of being crammed into five days, is spread over six, lessening the work of each day, and giving plenty of time for exercise and recreation.

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In the second, the students have many hours after school for study by day light, a no small saving of eye sight, and relieving them of the necessity of contracting the pernicious habit of sitting up late at night preparing their lessons. I find little or no complaints as to ill health among the students, and their eye sight has in but very rare instances been affected by attendance in school and consequent study.

Yours, very truly,
A. MACDONALD.

A Communication accompanying the vital statistics of the St. Paul High School, by Chas. H. Boardman, M. D., of St. Paul.

Of the pupils of the High School examined by me, 180 in a total of 200, the majority presented an appearance of excellent health; the proportion of those who were manifestly delicate was very small. Still it is no doubt true, that a more critical investigation would reveal a lower standard than could be ascertained by a mere inspection or a few cursory questions; and it is probably equally true, that this would hold good of more girls than boys.

The fact that it is known that here and there a girl is suffering from causes which need not here be detailed, and whose health is more or less impaired by influences which are peculiarly obnoxious at the period of sexual development, warrant the assumption that there are others possibly not a few, who, although warned by nature that a physiological process may become pathological, have not yet made complaint.

Among the statistics herewith transmitted, two features relating to this subject are significant and require no comment, the length of time devoted by the girls to study, and the frequency of headaches among them, 50 per cent. being affected in this way.

In connection with this topic reference might be made to the total absence of facilities for exercise, to the frequent ascent of stairs, and to the miserably imperfect ventilation of the main room of the High School. Of course I do not refer in the foregoing remarks to the derangement of any single function, but multiform evils which spring from lack of proper regard to the demands of nature, at a critical period, and which need not be enumerated. Those who care to enter upon a fuller consideration of the subject are referred to Dr. Mitchell's "Wear and Tear," and Dr. Clarke's "Sex in Education."

The causes of, as well as the remedies for the physical disabilities noted at the St. Paul High School, demand more careful consideration than it is possible for the writer at present to bestow. Reference will therefore be made only to some of the more obvious defects which were observed, and for which the proper correctives will be suggested by their mere mention.

It may be here premised that no special infirmity was discovered except headaches, so far as could be ascertained by a hasty and necessarily imperfect examination of the pupils themselves. These, however, existed, as stated above, in the proportion of 50 per cent.

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among the girls, and of nearly 25 per cent. among the boys. Without information as to specific causes, which doubtless obtain in some degree, or of individual cases, the difficulty may fairly be attributed in great measure, at least, to certain influences whose operation must be as prejudicial to health as their existence is apparent.

First among these causes may be placed deficient ventilation. The main or assembly room of the school, a large apartment, the dimensions of which I cannot now state, but in which at stated periods is collected the entire school, numbering over two hundred, has as its only direct cold air supply a duct of 7 inches in diameter; this being supplemented by the occasional opening of windows at recess. In the ceiling are several circular openings, in accordance with the system once regarded as orthodox. The same absence of ventilation is observable in the smaller recitation rooms, in which supplies of fresh air can be obtained only in the brief intervals which occur in the changing of classes. No comment is required to emphasize the inadequacy and imperfection of this arrangement.

Closely associated with this evil is the total absence of facilities for exercise. Without proper adaptation to the purpose for which it is used, the High School building stands at the intersection of two of the busiest streets in the city, leaving neither play grounds nor gymnasiums, and affording no opportunity for relaxation other than strolling about the class rooms, or up and down stairs in the hall. It is true that some compensation is found in many instances, in the long walks which must be taken in going to and returning from school, but this privilege is not enjoyed by all, nor does it supply the place of the appliances which should be found in a well ordered school.

Again, the conclusion can scarcely be avoided, that many of the pupils, notably among the girls, devote an amount of time to their studies, in addition to the regular school hours, that is largely accountable for the departure from a healthy standard. That eight, nine, and in a few instances, ten hours per diem of more or less active brain work must make trouble, especially for those in whom the process of development is yet in progress, is axiomatic, and therefore requires no demonstration. As a rule, those who studied longest were most prone to suffer.

Reference may be made in this connection to conditions concerning which no questions could be asked of the pupils, but which existed in certain cases as ascertained from other sources; although it is improbable that the whole number of these is known.

Opportunity is at present wanting to secure information for the basis of an opinion as to the effect, if any, upon the health of the pupils of the arrangement of the school rooms, of the style of seats and desks, of the system of rating scholarship, and for the determination of other questions of interest and importance.

Further and more systematic inquiry with reference to these subjects is desirable and should be instituted.

C. H. BOARDMAN.

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From Dr. Francis Atwood, report of examination of Sight and Hearing in pupils of St. Paul High School.

ST. PAUL, MINN., Dec. 14, 1877.

Dr. Hewitt.

DEAR SIR:—I have finished making the examination in 191 pupils in high school. In testing sight I used "Suellen's Type" at 20 feet, of 105 girls 13 were myopic, of 86 boys 8 were myopic. As regards the hearing I found but very little trouble, there only being three or four whose hearing was materially affected.

Yours very respectfully,

FRANCIS ATWOOD.

From Dr. W. H. Leonard, Minneapolis, respecting vital statistics of Institution for Educating Deaf, Dumb and Blind, taken by him.

MINNEAPOLIS, Dec. 26, 1877.

DEAR DOCTOR:—I went down to Faribault, Monday. The enclosed is the result of my work. It is not altogether satisfactory though as well as could be done now. The scholars did not fully understand what was wanted of them. In inhaling we could not make them fill their lungs. Also in examining the eyes, the younger ones especially, the last on the list, we were not always certain whether they saw the letters or not.

I made only a few remarks. I look upon the greater part of them as strumous, even those who have had cerebro-spinal menengitis are of this class. It would have been well to have noticed this part of the examination more. I was hurried and had no time to visit the blind asylum. There are only two pupils left during holidays.

A way to fill up this institution and gain the confidence of the people and sensible mothers is to send Prof. Noyes or some reliable representative of the Institute out to visit subjects who should be inmates of the school.

Prof. Noyes was pleased with the plan of physical exercises in the colleges and schools, and hoped the board would recommend it for the Asylum, if so would purchase a spirometer.

Yours truly,

W. H. LEONARD.

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[NOTE, as to Barnes, Dry Spirometer, in the physical examinations at the State University and at Carleton College.

This instrument proves to be entirely unreliable for any other than comparative measurement. Suspecting it the Secretary wrote to Profesor Sperry and the subjoined notes of Professor Sperry and his assistant at Carleton explain the cause of error. It does not however affect materially the object for which these preliminary experiments were made, so that the conclusions are sufficiently accurate. The letters are subjoined in justice to the gentlemen who kindly investigated the accuracy of the instruments, and who promise to aid in the further collections of vital and health statistics.]

LETTER FROM PROFESSOR L. B. SPERRY, OF CARLETON COLLEGE, RESPECTING SPIROMETERS.

NORTHFIELD, MINN. Dec. 29th. 1877.

Dr. C. N. Hewitt, Red Wing, Minn.

DEAR SIR:—Circumstances prevented me from giving personal attention to the Spirometer yesterday, but my assistant, Mr. B. F. Thomas, made a careful examination of it. and reported the results to you by yesterday's mail. From our observations it will be seen that these Spirometers are not reliable for determining *actual chest capacity*; but for determining *comparative* chest capacity, they are of some value. In your report you can make such explanatory remarks on this subject as you may think wise. As soon as I get time and strength shall be glad to confer with you concerning some practicable method, of making exact observations in the direction of lung capacity. I am having a wet spirometer made with which to take careful observations during our next term.

Please excuse the use of an amanensis, I am on the sick list temporarily.

Yours respectfully,

L. B. SPERRY.

REPORT OF TESTS APPLIED TO THE "BARNES' DRY SPIROMETERS" BY PROF. B. F. THOMAS, CARLETON COLLEGE.

NORTHFIELD, MINN., Dec. 28th, 1877.

Dr. Hewitt, Sec. State Board of Health, Red Wing,

DEAR SIR—Being much interested in the vital statistics taken by Dr. Sperry, yourself, and others, and desiring to know to what extent the difference in results reached was due to imperfections and differences in apparatus used, I undertook the comparison of your spirometer with that of Dr. Sperry, and the determination of the *actual* capacity of each. I first compared the tubes upon which the numbers are stamped and found that, when the zeros of the two correspond, 450 on Dr. Sperry's instrument agrees exactly with 480 on yours. Then taking both apart and measuring the receivers, I found them to be exactly equal in external measurements, evidently made from the same pattern, hence the actual capacity of

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the two should be equal. This being true, the two will give different readings for the same amount of air, which was found to be the case when they were placed side by side and blown into by the same person, your instrument giving in each trial, from 20 to 30 units greater indication. The scales are inaccurately graduated, your own being the more regular in its divisions.

I then set about testing your instrument for actual capacity by displaced air, using the best method known to me, and working with great care and accuracy, recording the reading shown by the scale after each of twenty-four equal quantities of air was introduced. The actual capacity of the instrument is 355.5 cubic inches, corresponding to 500 of the scale, hence the indicated reading is too great by .31 of itself *at the end of the filling*. The error is greater in the first half of the filling, and is accounted for by the fact that, as the sides of the receiving sack are collapsed, bent *inward* during the early stages of the filling, and the folds do not become distended readily, the introduction of a quantity of air when the instrument is nearly empty, will cause a greater vertical motion (to compensate for the smaller diameter of chamber at this stage) than the introduction of a like quantity when it is nearly full, thus giving greater differences between successive readings in first half than in last half of filling. In the limited time at my command for the purpose, I was able to take but two series of readings, but as the amount of air introduced to cause a reading of 500, was in each series *exactly the same*, I feel justified in concluding from the great discrepancies observed between intermediate readings, that the instrument *is not all trustworthy*, because of the irregular results shown by it, due to irregularities in its folding and unfolding. It seems to me to have been intended for the use of traveling showmen and not for such ends as we seek. Am sorry to have been unable to extend the trials, and thus obtain more extended data, upon which to judge the piece. In view of the last conclusion named, we shall abandon the statistics obtained last year, and take a new series with a new instrument which I am having made, on the plan of the gas holders with moving bell. If you wish I will send you the record of trials of your instrument.

Yours very truly,

B. F. THOMAS.

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A LETTER UPON "THE CAUSES AND TREATMENT OF PAUPERISM," WITH THE METHODS AND EXPERIENCE OF THE "ST. PAUL SOCIETY FOR THE RELIEF OF THE POOR."

BY REV. E. W. CHASE, RELIEF SECRETARY, ST. PAUL.

ST. PAUL, DEC. 12, 1877.

Dr. C. N. Hewitt, Secretary State Board of Health, Red Wing, Minr.

DEAR SIR:—Your favor asking for the results of my long experience in dealing with the poor, together with my opinion of the "cause, treatment, and remedy of pauperism" was duly received.—The "cause" without doubt is primarily the same as that which leads to theft, simply an effort to procure a living without manual labor. This in case of paupers is usually superceded, and almost always accompanied by some vice* that is gradually destroying their vital energies and self respect so essential to all true manhood, for it is a significant fact that the great majority of the thousands who have applied to us for assistance the past eight years were young men with no families to support or good reasons to give why they should be in a destitute condition.

Charity is divine, and was doubtless implanted in the human heart for the purpose of providing for the neccessities of those who through misfortune or incapacity were unable to provide for themselves, but in inexperienced hands instead of accomplishing that purpose it more often encourages and fosters the very evil it seeks to relieve—for not more than one out of ten of those who are now receiving charity, but what could provide for themselves if they would—and we do not hesitate to say that the man who under any pretence whatever, asks and obtains assistance which by a proper use of his faculties he could provide for himself, is as guilty of a crime against society as if he had stolen it, and should be dealt with accordingly; and as a consequence he who feeds and shelters a tramp believing him to be such encourages mendicancy, and commits as great a wrong against the community as he who feeds and shelters a thief.

When the State has given every child within its borders an education befitting an American citizen, and offered him its unparalleled opportunities for gaining an honest living, it has a right to expect,

*Licentiousness, intemperance, &c., &c.

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and demand, that they should be improved, and he who refuses or neglects to do it, should be made to feel the penalty of the law, and opprobrium instead of the sympathy of society.

It is too much to hope that so great an evil can ever be entirely eradicted, but we are confident that it can be greatly checked and diminished many fold by the following "treatment."

Let the best and most influential citizens of each county unite in appointing some suitable man to investigate and keep a careful record of each individual case, with means to provide for the necessities of the deserving, and courage to expose imposters to the civil authrities, and theu provide every household with tickets to be given instead of money, food or clothing to all unknown applicants for aid directing them to this agent, and it will be found that no imposter will ever apply a second time; and as he can procure nothing but these tickets, he will soon be compelled to go to work or leave the place.

If this system could be adopted (as you suggest) throughout the State, the tramp troubles of the past year would never be repeated.

Please find enclosed material which we use in carrying on such a work in St. Paul. There will be no trouble in procuring the necessary funds when business men once understand the working of the system and find that the worthy are provided for, and impostors exposed and punished at one fourth of the cost of feeding and encouraging them.

Respectfully,

E. W. CHASE, Relief Secretary.

PLAN OF POOR RELIEF IN ST. PAUL.

How You can Aid our City Poor through the St. Paul Society for the Relief of the Poor.

The city is divided into twelve districts. Two or more managers represent the society in each. These districts and the residences of the managers are given on the other side of this sheet. All who desire to improve the condition of our city poor, relieve distress and prevent fraud and waste, are requested to become co-workers in their own districts, with those who represent the society there, and to promptly signify to them such willingness to co-operate in the work. You can aid the society for relief of the Poor:

First.—By becoming members of it, and securing other members. The annual dues are for gentlemen, $2.00; ladies, $1.00.

Second—By using and getting others to use the relief tickets issued by the society, which are furnished free to all applicants. Lunch tickets are furnished ten for $1.00.

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Third.—By contributing and getting others to contribute *money* in larger amounts for relief of our city poor.

Fourth.—By contributing and obtaining from others, gifts of clothing, fuel and food, which, next to money, are most useful in the work of relief.

Fifth.—By imparting information regarding the work of the society, interesting others in it, and thus securing their active co-operation.

Sixth.—By promptly reporting cases of destitution and suffering to the managers of the society in your district or to the relief secretary. In case of pressing need the application should, in all cases, be made direct to the relief secretary.

Remember that the society is at present without funds, and that however perfected its system, it can practically accomplish its object only so far as the humane and charitable furnish it the means to work with.

Saint Paul, Nov. 27, 1877.

RULES OF THE SOCIETY.

The fundamental rules of the society are:

First.—To regard each applicant for relief as entitled to charity until a careful examination proves the contrary; the relief, however, to be given only after a personal investigation of each case by visitation and enquiry.

Second.—To give necessary articles (immediately necessary) only—those which are least liable to misuse—and to give them in small quantities.

Third.—To continue aid only so long and such extent as is necessary, our object being to make the poor a party to their own improvement rather than to encourage dependence.

Fourth.—To discontinue aid to all who manifest a disposition to depend upon it, when the opportunity to help themselves is provided them; and finally to see that the aged and infirm, those who have become permanently dependent, are referred to and cared for by the commissioners of our public charities.

MAYOR MAXFIELD'S ENDORSEMENT.

Extract from a published letter of Mayor Maxfield to the society:

"Being familiar with the working of your society, the good it is accomplishing among our worthy poor, and its benfits to the city in exposing and driving from its limits professional beggars and imposters, I most heartily commend it, and your suggestions to our citizens, especially recommending to them the use of your tickets as the best means of aiding the distressed and exposing the unworthy.

"Very respectfully,

"T. J. MAXFIELD, Mayor of St. Paul."

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SMALL POX.

REPORTS AND NOTES OF ITS OCCURRENCE IN THE STATE IN 1877.

The first outbreak was in Viola, Olmstead county. The first case was that of a citizen of the town, just returned from a journey east. He had the disease four weeks before it was recognized; vide attached note of M. L. Sawyer, chairman of Town Board of Health.

VIOLA, MINN., May 4th, 1877.

Dr. Charles N. Hewitt.

DEAR SIR:—In accordance with the request of the State Board of Health, I write to inform you that we have the opinion of a practicing physician that there are several cases of small pox in our town. The cases so far have been very light and at first were not thought to be that disease.

It is now some four weeks since the first case occurred, and it has but just been ascertained that it was the small pox.

We shall be glad to have any information or advice from you which will be of use to us in controlling the disease. Hoping you will favor us with an immediate reply, I am

Yours respectfully,
M. L. SAWYER,
Chairman Town Board of Health.

In response the Secretary of this Board immediately sent him humanized virus and copies of our circulars on the prevention of small pox, also wrote to Dr. N. S. Tefft of Plainview, asking him to visit the infected district and take such measures on behalf of this Board as might be necessary. His report is appended.

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REPORT OF N. S. TEFFT, M. D.

PLAINVIEW, MINN., May 10, 1877.

MY DEAR SIR:—Yours of the 7th inst, received last night, and in reply would say, that last Saturday (May 5th,) the town Board of Health of the town of Viola, Olmstead county, requested me to visit three houses in their town, and report to them the disease that began to frighten some of the neighbors. The first call I made was at the house of Mr. S., where I found two little girls, one 7 or 8 years, and the other nine months old, sick about 10 days with the *small pox*. In the same bed with the older one, lay a young man about 22 years old, with three woolen shirts on, under a heavy quilt, sick about 4 or 5 days with the same disease, the pustules just forming, with every evidence of the confluent form. These were all in one small room, about 12x14 with a cooking stove in which was a brisk fire, with windows and doors closed, I learned that Mr. S. had been to New York, and very soon after his return (about 5 weeks ago,) he was taken with pain in his head and back, and two or three days after, a slight eruption appeared. He thought nothing about it in particular, until his little boy was taken sick, had considerable of an eruption, but had very nearly recovered. Then came these cases. They called in an "*Irregular*," on a *regular* ignoramus, who called it "French Measles," and assured them that they need have no fears of its being small pox. About 60 rods south from Mr. S., I found Mr. O. with modified small pox. He stated that he had met Mr. S. several times since S's. return, had been there since they were sick, and that he had taken ginger tea, and kept warm, to bring the "thing out." About 80 rods north from Mr. S. I found Mr. P. in bed, with a very slight eruption, evidently varioloid, Mrs. P. had just recovered from what he called "something similar."

I advised them to put the young man at S's. into another room, take off two or three of his shirts, to remove the cook stove, and ventilate the house.

At S's. there is still another boy 7 or 8 years old, who has not had vaccination work, at O's. two I think, and at P's. four small children, and strange to say, showed no symptoms of the disease, although constantly with it for the last 4 or 5 weeks.

After leaving a little medicine for the young man, and giving some other advice in regard to care &c., I immediately reported to the Board, and assisted in drafting some regulations (for posting) prohibiting all communications with the infected houses, without consent of the Board; and placing a sign painted in large letters "*small pox*" near each infected house, shutting up the road, and advised them to procure proper nurses, and a suitable person to hold a constant communication with them and the outside world, and to furnish such things, and help as they might need.

They immediately complied with my recommendations and in a very few hours had the thing in fair shape.

Last night I received yours of the 7th, and to-day I have visited them according to your desire. *No new cases!*

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The youngest child of Mr. S's. seems to be doing well, the older one complains of pain in head and one eye seems turned in towards the nose.

The young man at S's. is very bad, face swollen—cofluent on face and thighs, complains of great prostration. He will probably die.

Mr. O. is convalescent, able to be out some. Mrs. P. has very nearly recovered, although complains of great weakness. The four children are all well except the youngest, it has drooped a little for the last 24 hours.

I advised them to bury their clothes, fumigate their house &c. The regulations of the Board have been strictly and I believe cheerfully carried out, and I should regard it as morally certain that the disease would stop where it is, were it not for the fact, that under the assurance that it was not small pox, no pains was taken to confine it, until about the time I first saw them, and that Mrs. S., (and I believe one other person) went to the village of Elgin, trading in a store, and meeting several friends, with scabs still in her hair, after nursing her infant already broken out with unmodified small poll, although not far advanced; and also that the young man stayed all night, and slept with another person in an adjoining neighborhood, after he was taken, before returning to Mr. S.

I have written this after 11 o'clock to-night, and after four or five days of very active practice, shall be pleased to hear from you, and any suggestions gladly received.

Very truly yours,

N. S. TEFFT.

Under date May 23d, Mr. Sawyer reports "The local health board faithfully carried out regulations advised; the young man at Mr. S.'s dead; other cases convalescent. The disease did not get beyond the three families in which it was when measures were taken to control it."

Dr. E. C. Cross, of Rochester, and N. Engle, of Elgin, were of material service in vaccinating and watching the disease on opposite sides of the infected district.

We append a note from Mr. Sawyer, giving the pecuniary cost of the endemic.

VIOLA, Minn., Dec. 11, 1877.

Dr. C. N. Hewitt, Secretary State Board of Health:

DEAR SIR:—Your inquiry of Dec. 4th, is received.

Expense of physicians	$135 00
" nurse	36 00
Assistant nurse, board and clothes destroyed	44 00
Incidental expenses	30 00
Total	$245 00

It may be there are some items that I do not think of now, but it is nearly correct. Will get you the exact figures if you wish for them.

Yours truly,

M. L. SAWYER.

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The only other outbreak occurred in Wadena, Wadena county, of which the first notice received by this Board, was a call for vaccine from local health board, dated June 15th, which was met with humanized virus by Dr. Hand, President of the Board.

June 22d, Dr. J. C Rosser, of Brainerd, visited Wadena at request of this Board, who reported as follows:

BRAINERD, Minn., June 23, 1877.

C. N. Hewitt, M. D.

MY DEAR DOCTOR:—I visited Wadena yesterday and found three cases of varioloid, and five cases of confluent small pox. All the sick are in one small house ill ventilated, and I suggested to the county supervisors that large tents would be preferable.

They need a physician on the ground all the time until the trouble is over. They are without medicine or disinfectants—however, I sent enough of both to last a few days, yesterday. I think the necessary precautions have been taken to prevent the further spreading of the disease.

I am in communication with Dr. Hand, regarding this matter, and have give Wadena and its vicinity a thorough vaccinating. I vaccinated about 75 persons yesterday. The people would be glad to see you at Wadena. These are all the facts I can think of.

With much regard your most obedient servant,

J. C. ROSSER.

June 26th, our Secretary visited Wadena at the request of the Local Health Board. After consultation with them he advised the appointment of Dr. Wilson of Moorehead, as health officer; addressed a meeting of the citizens called for the purpose; urged them to sustain their Local Board in their efforts, and to make vaccination and re-vaccination as general as possible.

There are some features of this outbreak of small pox, deserving of mention as showing very clearly the necessity for prompt action in the presence, of even a *single mild case of varioloid*, and how far from a rail road town the contagion may be carried by travelers.

The original case here was a hotel keeper who it is believed caught the disease from immigrants in a smoking car on the N. P. R. R. The attack was mild. He was sick on the 12th of May, and able to be around again on the 19th. The evidence shows his disease to have been probably varioloid and a mild attack. All the the other cases in Wadena can be traced to this one, and some of them were confluent small pox, too. He kept a hotel, and before he was at all certain what his disease was, or had ceased to entertain travelers, six persons not residents of Wadena village had been exposed to the infection. They caught it, and their history we can trace.

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1. A farmer living four miles out, saw him for half hour on business while he was in bed. At about the 10th day thereafter this farmer came down with varioloid, and gave it to his wife and children; to a neighbor Mr. C. who attended him, and to another man at work there.

2. Miss S., school teacher at New York Mills, stopped over night May 25 at this hotel, sleeping in the same bed that P. had occupied when sick, but with clean pillow cases, sheets and blankets, on June 15th she went to Wadena hospital with confluent small pox.

3. Mrs. H. came with child to the hotel after P's. convalescence staid five or six days. After her return home two miles south, her child had the disease.

4. A gentleman from Litchfield, Mr. D. P., visited in Wadena at the house of a gentleman who attended Mr. P., and who had at the time a rash which he called chicken pox, he returned to Litchfield, and in due time had small pox, but thanks to the care of Dr. F. E. Bissell, health officer there, the disease was not permitted to go beyond this case.

5. J. McS. was at hotel when P. was sick. May 28th he left for Yellowstone, reached Fort Stevenson on the 6th June, and died of confluent small pox on the 13th.

6. Mr. B. travelling agent, stopped at this hotel from 4 p. m. to 10 p. m. May 25th, taking supper, and calling on the gentleman last mentioned as believing he had the chicken pox. B. went on to Fort Garry, and in due time came down there with confluent small pox. No other cases originated from his, as he was carefully quarantined.

The exact number of cases which occurred in Wadena and vicinity and the deaths, have not been reported to us, though called for.

It is proper to say that as soon as the Local Health Board were satisfied of the character of the disease, they took such means as their medical advisers suggested. In this they had the cordial co-operation of some of the leading citizens as we can testify.

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FINANCIAL STATEMENT.

	Dr.	
Total in hand from appropriation of 1876	$	73 75
" appropriation of 1877	1,000	00
Total	$1,073	75

	Cr.		
By Secretary's Salary	$500	00	
Traveling Expenses of Members	143	00	
Paid Prof. S. F. Peckham:			
One half expenses of analysis of waters of Red River Valley $75 00			
Analysis of suspected waters, kerosene and Enamelled Iron ware 38 55	113	55	
Telegraphing Postage, express, &c	26	40	
Bought Fanning, on Water supply	6	00	
Bought sundry Pamphlets on Sanitary subjects	2	50	
Subscription to Sanitary Journals	45	00	
Bought Spirometer and Express on same	13	33	
Paid Dr. N. S. Teft for services	15	00	
Paid Dr. F. Atwood "	10	00	
Paid Dr. C. H. Boardman "	15	00	
Expenses Committee on Meteorology	10	00	
Printing	10	00	
Estimate expense of Binding Reports	18	00	
" of books ordered but not received	86	00	
			$1,013 78

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INDEX.

	Page.
Agate—Iron Ware, Chemical Examination of	68
Anderson Sergt., U. S. Sig. S.,—Meteorology of Breckenridge	46
Atwood, Dr. F., on Sight and Hearing of Pupils, St. Paul High School	106
Barnes, Sergt. U. S. Sig. S.—Meteorology of St. Paul	45
Bascom, President University of Wisconsin, on Co-education	82
Bessant, Sergt. U. S. Sig. S.—Meteorology of Duluth	45
Bissell, Dr. F. E., Health Officer of Litchfield	8
Blood, Solomon, M. D.—Meteorology of Owatonna	45
Bois de Sioux River, Analysis of Water of (No. 5.)	63
Boardman, Dr. C. H.—Co-education in St. Paul High School	94
" on Vital Statistics St. Paul High School	105
Bright's Disease; Not common in Norway	39
Bramble House, Moorhead, Analysis of Well Water at (No. 10.)	63
Breckenridge, Meteorology of	45
" Two Wells at, Analysis of Water in	63-64
Bronchitis, Acute, in Norway and Minnesota	39
Bronchocele, Struma, in Norway	40
Burrington, Supt. Schools in St. Paul, on Co-education	93
Burt, Hon. D., Supt. Public Instruction, on Co-education	97
Campbell Station, St. P. & P. R. R., Analysis of Water from (No. 3.)	63
Carleton College, some Vital Statistics from	102
" " President Strong on Co-education	87
Cheney, W., Esq.—Meteorology of Minneapolis	46
Chase, Rev. E. W., of Poverty and Pauperism	109
Children, feeble minded, School for advised	11
Climate of Minnesota, Influence of on Immigrants	32
" " " " Nervous System	27
Co-education, Questions concerning, addressed to Teachers	78
" Abstract of Opinions of Teachers concerning	72
" Opinions of Teachers concerning	79-100
" Discussion concerning in University of Wisconsin	80-84
" in University of Minnesota	84-87
" in Carleton College	87-90
" in Normal School at Winona	90
" " " at Mankato	91
" " " at St. Cloud	92
" in Schools of St. Paul	93
" in Schools of Minneapolis	95
" in Schools of Red Wing	96

Digitized by Google

Page.
Conjunctivitis, Uncommon in Norway ... 39
" Frequent in Minnesota ... 39
Conolly's, on Red River, Analysis on Water in Well at (No. 7) ... 63
Consumption, Influence of Climate of Minnesota on ...
" Statistics of in Minnesota ... 29
" " " " Norway ... 35
" " " " Among different Nationalities in Minnesota ... 37
" Conclusions respecting ... 37
" a Disease of Seacoasts and Lowlands ... 37
Cross, Dr. E. C., Services in Vaccinating ... 7
Deaf and Dumb, Vital Statistics of ... 102
Diseases, Table of Comparative Mortality from ... 40
" Comparative Frequency of in Minnesota and Norway ... 38
Duluth, Meteorology of ... 45
Enamel on Iron Ware, Chemical Examination of ... 67
" " " " Antimony detected in ... 68
" " " " Lead detected in ... 68
Engle, Dr. N., Services in Vaccination ... 7
Exposition International at Paris, representation by Board requested ... 13
" " Plan for Exhibition there ... 13
Financial Statement State Board of Health ... 117
Folwell, President of University of Minnesota, on Co-education ... 84
Geological Survey Co-operation in Water Survey of Red River Valley ... 12
Girls—Comparative Health on Entering School ... 72
" " Scholarship in School ... 73
" " Absence on account of sickness ... 74
" Influence of School-going on Health of ... 75
" " of Extra Studies " " " ... 76
" " of Co-education on Manners and Morals of ... 77
" Health of those Highest in Scholarship ... 74
Glyndon, Analysis of Water from Wells at ... 63
Granite Ware " contains Antimony ... 68
" " Suitable for most Domestic Uses except Cooking Acids ... 68
Gronvald, Dr. Ch., Report on Norwegian Immigration ... 17
Hygiene, Lectures on at University ... 9
Immigrants, Norwegian, Effect of Immigration on ... 17
" " Diseases affecting ... 24
" " Dyspepsia among ... 24
" " Insanity among ... 29
" " Nervous Disorders among ... 26
" " Present Condition of ... 41
" " Influence of Immigration upon Mental Development 22
" " Influence of Immigration upon bodily Development 23
Insane, Hospital for is full to overflow ... 11
" Statistics of in Minnesota ... 29
Indians, White Earth Reservation Visit to ... 8
Iron Ware Marbleized, Lead found in ... 68
" " Granite, Antimony found in ... 68
Johns, Principal Normal School, Mankato, on Co-education ... 91
Kiehle, Principal Normal School at St. Cloud, on Co-education ... 92
Lead found in "Marbleized" Iron Ware ... 68

Digitized by Google

Page.
Light, Distribution of in Norway 19
Leanard, Dr. W. H., on Vital Statistics Deaf and Dumb 106
Macdonald, Dr. A., Vital Statistics St. Cloud Normal School 103
Marlatt, S., Esq., Meteorology of St. Cloud 46
Members State Board of Health, Names and Residences 5
Meteorology of Minnesota, Report on 45
Methods Scholastic—their Relations to Health 71
Mc Cauleyville, Analysis of Water from (No. 8.) 63
Minneapolis Public Schools, Co-education in 95
" Meteorology of 45
Moorhead, Analysis of Waters from (Nos. 9 & 10) 63
Morey, Principal Normal School at Winona, on Co-education 91
Normal School at Winona, Co-education in 90
" " " " Vital Statistics of 102
" " " Mankato, Co-education in 91
" " " St. Cloud, " " 92
" " " " Vital Statistics of 102
Norway Adapted to a Seafaring People 21
" Climate of 19
" Distribution of Light in 19
" Diseases, percentage of Death from in 40
" " prevalent in 38
" Population of adapted to Immigration 22
" " seafaring of 21
" Topography of, general 18
" " of West Coast 18
" " of Inland 19
" Tables of Temperature and Rainfall 21
Noyes, Supt. of Institution for Deaf and Dumb, on Co-education 99
Otter Tail River, Analysis of Water of (No. 4.) 63
Owatonna, Meteorology of 49
Peckham, Prof. Univ. of Minnesota, on Co-education 85
Pneumonia in Norway 39
Poverty and Pauperism 13
" " " Report on 109
Poor Relief Systematic, St. Paul Plan 110
Prison State, General Report on 12
" " a New One necessary 12
Pupils in Public Schools, Report on Health of 71
" " " " Vital Statistics of 102
Questions as to Co-education addressed to Teachers 78
Red River Valley, Sanitary Water Survey of 57
" " " Chemical Analysis of Waters of 63
" " " Waters of vary greatly in Composition 60–61
Red Wing, Co-education in Public Schools of 96
" " Vital Statistics of High School 102
Regents of Univ. of Minn. order Collection of Vital Statistics of Pupils in 71
Report General of State Board of Health 7
" on effect of Immigration upon the Norwegian population of Minn. 17
" of Sanitary Water Survey of State for 1877 57
" on Chemistry of Red River Valley Water Supply 58

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Page.
Report on Chemistry of Enameled Iron Ware..... 67
" on Endemics of Small Pox in 1877..... 112
" on Meteorology of Minnesota..... 45
" on Poverty and Pauperism, Cause and Cure..... 109
Rosser, Dr. John C., on Small Pox at Wadena..... 115
Sawyer, M. L., Ch'n Local Board of Health at Viola, on Small Pox there. 112–114
Schools Public of Minnesota, Co-education in..... 72
" " " Vital Statistics of..... 102
School for Blind should be better Attended..... 11
" for feeble-minded Children Advised..... 11
Small Pox, General Report on..... 7
" " Notes and Reports of in 1877..... 112
Sjudalskhed, Influence of Immigration on..... 39
" Statistics of in Norway..... 39
Sperry, Prof., on Spirometer and Vital Statistics..... 107
St. Gabrielle Springs near Campbell, Analysis of Water of (No. 2.)..... 63
Spirometer Barnes', Tests of..... 107
St. Cloud, Meteorology of..... 45
St. Paul, Meteorology of..... 45
" Public Schools, Co-education in.....
" High School. Vital Statistics of..... 102
" " " Dr. Boardman on..... 104
" Society for Relief on the Poor Plans of..... 110
" " " " Secretary Report of..... 109
Strong, Pres. Carleton College, on Co-education..... 87
Stillwater, Meteorology of..... 45
Staples, Dr. Franklin, Reports Meteorology of Winona..... 46
Survey Sanitary of Red River Valley Water Supply..... 53
Teft, Dr. N. S., on Small Pox at Viola..... 113
Temperature and Humidity, Monthly Means in Minnesota..... 46–47
" " " Maxima and Minima of..... 48
Thomas Pry, B. F., Tests of Barnes' Dry Spirometer..... 107
Tintah, Analysis of Water from flowing Well at (No. 1.)..... 63
Tousley, Prof., Supt. Public Schools of Minneapolis on Co-education..... 95
Typhoid Fever. Statistics of in Minnesota..... 38
" " " Norway..... 38
" " Immunity from of Finns and Indians..... 38
University of Minnesota, Vital Statistics of..... 102
" " Co-education in..... 84–85
" of Wisconsin. Co-education in..... 79–84
Vaccination more general than ever before in the State..... 9
Vaccine Virus, Animal. furnished by the State Board of Health at Cost... 9
Varioloid, Danger from one Case of. Illustrated..... 115
Viola. Endemic of Small Pox in..... 7
" " " Report on..... 112
Vital Statistics of Schools, Proposed Method of Collecting..... 10
" " to be Regularly Recorded at the University..... 10
Wadena, Small Pox at..... 7
" " " Report on..... 115

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Page.
Waters of Red River Valley, Report on..... 57
" " " " Analysis of..... 58
" Methods of Analysis of..... 59
Water Well, Precautions as to..... 57
" " Simple Filter for..... 58
" " Surface to be Avoided..... 57
Wells, Proper Construction of..... 57
" Drive..... 58
" Artesian, or Bored..... 58
" Zinc Lined Pipe for Condemned..... 58
" Wood Lining for Condemned..... 57
" Cement or Cement Pipe Advised for Lining..... 57
Whitman, Prof., Supt. Red Wing Public Schools on Co-education..... 96
Wilson, Dr., of Moorhead, Health Officer at Wadena..... 8
Winnipeg Health Board to Co-operate with this Board..... 8
Winona, Meteorology of..... 45
" High School, Vital Statistics of..... 102
" Normal School, Vital Statistics of..... 102
" " " Co-education..... 90

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SEVENTH ANNUAL REPORT

OF THE

15379

STATE BOARD OF HEALTH,

OF

MINNESOTA,

JANUARY, 1879.

PRINTED BY AUTHORITY.

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SEVENTH ANNUAL REPORT

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MINNESOTA STATE BOARD OF HEALTH,
SECRETARY'S OFFICE,
RED WING, Feby. 5th, 1879.

To His Excellency Hon. John S. Pillsbury,
Governor of Minnesota.

SIR:—I have the honor herewith to transmit the seventh annual report of the State Board of Health.

Very respectfully,
Your obedient servant,
CHARLES N. HEWITT,
Secretary.

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CONTENTS.

		Page.
1.	List of Names and place of Residence of Members of the Board	7
2.	General Report of the Board	9
3.	Report on Small Pox	15
4.	Report on Vaccination	23
5.	Report on Diphtheria	27
6.	Sanitary Water Survey of the State; Chemical Analysis of Drinking Waters	85
7.	Report on Dust Fires and Explosions	93
8.	Report on Yellow Fever	97
9.	The Meteorology of Minnesota	107
10.	The Relations of Scholastic Methods to the Health of Children in Public Schools	115
11.	Financial Statements	126

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MEMBERS STATE BOARD OF HEALTH.

D. W. HAND, M. D., St. Paul.
V. SMITH, M. D., Duluth.
CHARLES N. HEWITT, M. D., Red Wing.
FRANKLIN STAPLES, M. D., Winona.
W. H. LEONARD, M. D., Minneapolis.
E. J. DAVIS, M. D., Mankato.
CH. GRONVALD, M. D., Holden.

NOTE.—All communications for the Board should be addressed to
SECRETARY STATE BOARD OF HEALTH,
Red Wing, Minn.

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GENERAL REPORT.

State Board of Health have the honor to report their work for 1878.

DISEASE PREVALENCE.

Small Pox.

Small pox has effected a lodgement among our population twice during the year. Once it appeared at Grand Forks, D. T., just across the Red River. We were called upon for assistance, and gave it promptly, sending physicians, a nurse, vaccine virus and other supplies. Reports of these Endemics will be found in the appendix page 15. During the last two years,(1877-78) this disease has appeared in Minnesota four times. In every instance it was imported, twice from states east of us or Canada, (once certainly from Wisconsin) and once from Winnipeg. At Grand Forks it began in an immigrant, who brought it with him, we believe, from Canada. There has happened to be no competent physician in charge of the first cases, so that disease has had greater opportunity to spread than it would otherwise have had.

At Viola, Olmstead county, in 1877, the first cases were called "French Measles" by the doctor in attendance. At Wadena they were called "Meas'es." At Fisher's Landing the doctors seem to have been in doubt of the identity of confluent Small Pox and called it "Chicken Pox." The first cases at Grand Forks were not seen by a physician.

At Mankato, last winter, the attending physician did not recognize the disease, till it had existed two weeks, and then advised the parents of the patients to keep the facts to themselves, at the same time permitting access to the sick room, by neighbors and acquaintances. The result of this ignorance, or criminal carelessness, was speedily apparent—27 cases of the disease in eleven families in Mankato, with four deaths. Outside the city, in the adjacent

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country, there occurred 11 cases and three deaths, a total of 38 cases and 7 deaths, every one of which has been clearly traced to the original case.

At Grand Forks there were 27 cases and 7 deaths. Despite this delay in recognizing the disease, when the truth was known, this Board was asked for help or volunteered it, as at Mankato. We sent competent physicians where they were needed, with vaccine, disinfectants, and nurses when necessary. Except at Mankato no new cases occurred after we had the disease under observation. Efficient measures were adopted by the local Board of Health at Mankato, with the co-operation of this Board. Animal vaccine was thoroughly and successfully used there. Dr. Davis, of this Board, contributes a report upon this subject (appendix page 23). It would be better if the legal penalties were enforced for neglect to report infectious diseases to local health authorities and this board. This loathsome disease might be literally "stamped out" if people would remember two facts as respects Small Pox.

First—that our comparative exemption from its attack is due entirely to vaccination and to strict quarantine of sufferers from the disease, by Boards of Health to whom all suspected cases of disease should be immediately reported.

Second—that vaccination should always be repeated after the fifteenth year, and in *case of doubt*, at any time when in danger of Small Pox.

We repeat what we have said in preceding reports. Animal vaccine direct from the heifer, pure and active, is easily obtained. All that has been used by our advice, for several years, has been obtained from Dr. E. L. Griffin, Fond du Lac, Wisconsin, who maintains a constant supply, from healthy animals, under his own supervision. Our secretary is authorized to supply this virus, at cost price to all who apply for it. (Present price is $1.00 for 10 points). It can be as well obtained by the family physician, who should always, when possible, use it, and watch its operation.

Diphtheria.

One other disease, Diphtheria, has been endemic in many localities in our state for two years, and has assumed a very virulent form in some towns during the fall and winter of 1878.

The most marked endemic occurred at Mankato. It began in July and has continued, with more or less severity, to date, though the number of cases and mortality are less than at first. Not far from 350 cases have been treated by physicians, of whom 13.7 per cent.

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died. This Board has given every aid possible to the local authorities. A special committee, of which Dr. Franklin Staples is chairman, have visited Mankato and other districts suffering from this disease.

An extensive correspondence has been had with leading physicians throughout the state, and their opinions with those of the committee, are given by Dr. Staples in the report on Diphtheria (appendix page 27). We call attention to this valuable paper, and repeat the warning often given before, that Diphtheria and diseases of the class to which it belongs, if not directly caused by foul air and water, and by filth-saturated soil, find in such conditions those most favorable to their development and malignancy.

This is the testimony of the correspondents of the Board, of all sanitary experience, and finds powerful collateral support in the analysis of suspected drinking water, given by Prof. Peckham in the succeeding report.

The Sanitary Water Survey of the State.

This work began early in the history of the Board, has been steadily maintained as opportunity offered and our funds permitted

This year we give a valuable contribution by the state chemist, (appendix page 85). Samples of drinking water from suspected and other wells in Mankato are compared with the drinking water of other towns.

Prof. Peckham, at the request of the Board, visited Mankato, and his observations are worthy of serious consideration.

He lays special stress upon the constant and increasing danger of soil and water pollution by the usual methods of making cess pools and privy vaults, and the still more objectionable, and harmful practice of covering up the old vaults when new ones are made.

In towns, no longer settled than those on the Minnesota and Mississippi rivers, the danger, to the water and air supply, from these sources, is already proven to be a serious cause of ill health and acute disease.

The only cities having a system of water supply and sewers, *the one as essential as the other*, are St. Paul and Minneapolis. In neither is the system complete. The first gets its water supply from Lake Phalen, the other from the Mississippi River. A reference to Prof. Peckham's report will show that the last is contaminated with the city sewage, for which, as in St. Paul, the river is the common receptacle.

Winona has adopted the Holly system of constant supply from wells sunk in the gravel of the riverbank. There is no system of sewers.

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The river towns must speedily provide these essentials of public health, to avoid the increase of those low fevers which are indices of filth pollution.

During 1879, this Board proposes to continue the study of the water supply of our larger towns, and hopes to be able to assist the growth of popular opinion in favor of these essentials of healthy living in centers of population.

Yellow Fever.

(Appendix, page 97.)

By direction of the Board, the president and secretary attended the yellow fever conference of the American Public Health Association, at Richmond, Va., last fall. Dr. D. W. Hand reports the proceedings of that meeting, and relates the history of yellow fever in the United States, and his own extended experience in its management.

It has heretofore reached as far north as Minnesota, but its chief interest for us is found in the fact that it belongs to a large class of diseases, to most of which we are exposed, and the study of every one of them adds something to our knowledge of the laws of epidemics and of the means of preventing them. This is especially true in the case of yellow fever, which has attracted the attention and study of the ablest of the medical profession of the country.

Dust Fires and Explosions.

(Appendix, page 93.)

Under this title Prof. Peck gives a summary of the very important conclusions of his study into the causes of the fire and explosion of the Washburn mill, at Minneapolis.

No more important contribution to the hygiene of flouring mills has yet been made. The Professor suggests a form of lantern for use in such mills, by which the danger of accidents is practically removed. Such protection of lives and property ought to enforced by law.

Vaccination.

We submit the experience of physicians in Blue Earth county in the use of animal vaccine virus, in a report prepared by Dr. E. J Davis. (Appendix, page .)

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The Meteorology of Minnesota for 1878.

(Appendix, page 107.)

This work which we have maintained for several years, is of increasing importance. It sums up the monthly reports of the observers, of the Board, and of the Signal Service in the State. All appreciate the value of such work, but few, beside those who make the thousands of daily observations, know the labor involved. The thanks of the Board and of the State are due to these gentlemen who have done and continue to do this work.

Hospital for the Insane.

The permanent Hospital is crowded. As a consequence the sleeping rooms have too many occupants. It is hoped that the new Hospital, at Rochester, will give some relief.

The old Hospital, at St. Peter, is a "make shift" which ought to be discontinued.

School for Imbecile Children.

We repeat our recommendation that a school of this kind be established in connection with the Institution for Deaf and Dumb, at Faribault. There is room there, and Prof. Noyes proposed this arrangement last year.

There are at present in the Hospital for the Insane, ten boys and five girls of this class. They cannot be properly cared for at the Hospital. They occupy rooms needed by the Insane. There are many more children of this class in the State for whom some provisions ought to be made. Their claim is at least equal to that of the deaf, dumb or blind, and the proposed school, at Faribault, meets this need with the least expense to the State.

The Doors of Public Halls should Open Outward.

We call attention to the violations of the law requiring the doors of public halls to open outward. We cannot recall an instance in which it has been enforced. It should surely be obeyed in buildings belonging to the State. The public hall in the upper story of the Normal School, at Winona, is an example of this statement. In case of sudden panic or of fire in the building, it would be nearly impossible for an audience to escape in safety.

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The Relations of Scholastic Methods to the Health of Pupils in the Public Schools.

This report is a continuation of the investigation began last year. It gives the health statistics of the University, one Normal and one High School for 1878, and a comparison of the physical constants of the University and Amherst College, with the same data for the Naval Academy at Annapolis. In addition are given statistics of the men drafted into the army during the late war and of soldiers from Minnesota. These statistics are so arranged as to be available for study to all interested in the subject. As relates to the pupils in our Public Schools the value of the inquiry will be apparent. It will increase as the use of a "Health Record" becomes general throughout the state.

The conclusions from these data will help to answer many questions already discussed, as to the facts of the physical deterioration of our population, the influence of co-education upon the health of girls, and the influence of school going and of study upon children of both sexes.

The Vital Statistics of the State.

We call attention to the report of the Commissioner of Statistics. The vital statistics for 1878 have been edited by the secretary of this Board, who has consolidated the births and deaths for past years, and averaged the results.

It is in this way that the value of these statistics is most evident. There is very great carelessness apparent in the collection of the vital statistics. The compensation provided by law is sufficient to reward careful, honest work. Some means ought to be devised to insure it.

The secretary of the Board continues to serve as non-resident Professor of Public health at the University, giving annually a course of lectures upon sanitary subjects to the Senior class, and occasional addresses to the whole body of students. The financial statement is appended.

D. W. HAND,
V. SMITH,
CHARLES N. HEWITT,
FRANKLIN STAPLES,
W. H. LEONARD,
E. J. DAVIS,
CH. GRONVALD.

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REPORTS ON SMALL POX.

AT MANKATO, BY E. J. DAVIS, M. D.

AT FISHER'S LANDING AND CROOKSTON, BY JAS. DAVENPORT, M. D.

AT GRAND FORKS, D. T., BY JAY OWENS, M. D.

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REPORT ON SMALL POX AT MANKATO.

BY E. J. DAVIS, M. D.

On the sixth day of January last, I received information that there were cases of small pox in a family living in the north part of the city, and had the Mayor at once notified, and requested him to call a meeting of our local Board of Health, with the view of an immediate investigation, and that prompt action might be taken if the report proved to be true.

At the request of the board, Dr. C. F. Warner, health officer, and I, visited the family where it was reported to exist, and found two children sick with Variola; and in one of them we concluded that the disease had existed for about three weeks, for it was then in the third stage. Careful inquiry of the parents convinced us that the attending physician had, up to within a few days of our visit, failed to recognize the true character of the disease the children had, and when he did he concluded to adopt the policy of silence, the parents concurring, but this plan did not continue very long, for free access was still granted to the neighbors to the sick room and, as might have been expected, somebody reported them. When all the facts became publicly known our people were highly indignant, and that justly, at the physician for his stupidity and the parents for their carelessless. They were also considerably excited because of the fact that it was then impossible to tell how many persons had been exposed, hence we could not possibly predict how extensive the pestilence might yet become.

As to the origin of the disease we find that Mrs. S., of Mankato, left Port Washington, Wis., about Dec. 5th, with her two children, who had never been vaccinated, and was accompanied by Mr. La Fontaine, who had been exposed to small pox by visiting a friend, who had it, living in Belgium, Wis. He held Mrs. S.'s children on his lap much of the time during the journey.

Our local board of health promptly enforced a rigid quarantine of all families where the disease existed, and notified town authorities of all persons leaving the city and known or suspected of having been exposed.

In about two weeks after we were informed of the existence of the pestilence in our midst—there were several new cases reported and, as might be expected, the public pulse was at fever heat. The pupils attending the Normal School shared in this excitement, and for the purpose of allaying it, after consultation with Prof. John, principal, and Hon. O. O. Pitcher, local member of Normal Board, and at their request, I made a thorough inspection of the pupils, to

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see how many had not been vaccinated; also in how many cases of recent vaccination it had not taken. Out of upwards a hundred students, I vaccinated only thirty and they were all, excepting three or four cases of recent re-vaccination. By careful investigation we have been able to trace directly the origin of every new case, either in the city or county, and many of them to Mrs. S's. house; also found a public dance on New Year's night in that end of town to have been a prolific source for several cases. In the city we have had twenty-seven cases, in eleven different families—fourteen of Variola and thirteen of Varioloid.

In Blue Earth county, there have been one case of Variola and two of Varioloid in Lime township; three of Variola (all died) in McPherson township, and five of Varioloid in Lyra township, making the total number of cases in the county, thirty-eight—eighteen of Variola, twenty of Varioloid, and seven deaths of Variola; none of Varioloid.

Upon inquiry of Dr. Harrington, the attending physician (latterly) I learn that the cases of Varioloid were all among the adults, and were all vaccinated in youth, and none of them since reaching maturity. He also gives me the following: A laborer and a widower, with a family of five children, was attacked, and when seen by his physician, was covered with Varioloid eruption; the children were all immediately vaccinated for the first time. It took in one, and the others were re-vaccinated in five days. In three of them it took, but they all had Varioloid, and in the fifth it failed, and it had Variola. A brother-in-law, who said that he was vaccinated in childhood, visited the family, and had a sharp attack of Varioloid.

Many other cases might be given, showing the importance of vaccination and re-vaccination, and why every body should be urged to avail themselves of its benefits, but the above will suffice. From the recent outbreak of small-pox in Mankato and vicinity, we have learned that it matters not how general the disease may prevail, it can, by thorough vaccination and re-vaccination with fresh non-humanized virus, and complete isolation of the sick, be effectually and quickly stamped out.

E. J. DAVIS, M. D.

MANKATO, April 1st, 1878.

REPORT ON SMALL POX AT FISHER'S LANDING AND CROOKSTON.

BY JAS. DAVENPORT, M. D.

ST. PAUL, MINN., Feb. 7, 1878.

C. N. Hewitt, M. D., Sec'y Minn. State Board of Health.

DEAR SIR: Your request for my report on Variola at Fisher's Landing, received. At this late date I fail to remember all the details which were contained in a letter to Dr. D. W. Hand, at the time.

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June 3d, 1878, at the request of the authorities of the St. P. & P. R. R. Co., I proceeded to Fisher's Landing, on the Red Lake river, a place of but two hundred inhabitants, with, however, a very large daily transfer of emigrants from the railroad to the river, *en route* for Manitoba. This, with the constant change incident to trainmen's life, afforded a serious opportunity for the spread of any contagious disease.

I found this small town in a state of intense excitement; passengers in transit huddled on the river bank, afraid to go to the stores to buy even food. In fact, although any idea of small pox prevailing at the landing had been suppressed almost entirely, yet already travel was seriously affected. The townspeople were equally scared.

I proceeded at once to vaccinate all who would consent to the operation, and during my stay must have vaccinated between three and four hundred. I used humanized crusts dissolved in glycerine and water, and latter fresh points from the calf. The vaccinations were very successful, and with no bad results. The usual prejudice was found, but the scare generally overcame it.

The origin of this endemic of Variola I trace to a woman, who, going from the States to Winnipeg, Manitoba, returned to Fisher's Landing about fourteen days later, and here was taken ill of a fever, attended by an eruption, and dying early from some complication, This woman had been seen by physicians and pronounced a case of chicken pox. Of the persons who attended on this case, but one developed Varioloid. Later from her another case of Varioloid occurred. A telegraph operator sleeping in a room contiguous to the one occupied by the first case developed a severe discrete small pox. The townspeople had removed him to a pest house about two miles from the town, supplied with all things needed, and watches or nurses. He was most faithfully attended by Dr. Welch of Crookston, and made a good recovery.

The two cases of Varioloid were confined to their respective homes, one on the border of the town, the other three miles out on the prairie. Neither of these cases required any particular treatment, and what Dr. Welch's patient received I do not know.

About the 20th of June, after I had returned to St. Paul, a brakeman developed small pox at Crookston, twelve miles from Fisher's Landing. He was quarantined and died.

I vaccinated many railroad employees along the line of the St. P. & P. R. R., near the terminus.

One thing was very evident, that, considering the exposure there had been before my arrival at Fisher's Landing, it was remarkable that there were so few cases of this dreaded disease.

Yours very truly,

JAS. DAVENPORT.

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REPORT ON SMALL POX AT GRAND FORKS, D. T.

BY JAY OWENS, M. D.

SAINT PAUL, MINNESOTA, Dec. 10th, 1878.

To D. W. Hand, M. D., Pres. af the Board of Health of the State of Minnesota.

DEAR DOCTOR: I have the honor to make the following report of the epidemic of Variola which existed at and near Grand Forks, D. T., in the months of October and November, 1878.

I arrived at Grand Forks on the 21st of November. Met Dr. Simons who went to Grand Forks a week earlier than I, and who, immediately after his arrival, suffered an attack of sickness, which rendered it impossible for him to attend the patients in the country, but with great pain and inconvenience he managed to attend the case in the town, Dr. Hacston.

In the evening a meeting of the Board of County Commissioners was held, and it was then decided to give me full authority to do as I should think best, to aid those sick and to prevent the spread of the disease.

On the 22d I went twelve miles south of Grand Forks, and visited four families which were infected. I found that there had been five deaths, that there were ten cases sick, and that eight had recovered or were convalescent. Four new cases appeared within the next few days. At 11:30 p. m. Dr. Hacston, the patient in town, died and was promptly buried. All clothing, &c., which could convey the virus, was taken one-half mile from town, and burned, and the house, which had been thoroughly fumigated with sulphur and chlorine gas, cleaned and whitewashed. The clothing of those employed in this work was burned, and new furnished them.

I continued to visit the country every day or every other day; changing my clothing before entering the infected houses, and rechanging after leaving them.

On the 25th of November, a patient ten months old died. The cases where death was the termination, were all of the confluent variety. No case of this variety recovered. Death was caused in some cases by the severity of the disease in the throat, and in others by exhaustion; no cases dying before the stage of pustulation.

Of the total number of cases, twenty-seven were of the confluent variety, five of the semi-confluent, and fifteen were discrete or varioloid. In one house of about fourteen by sixteen and ten feet high at ridge pole, ten cases were sick at the same time, of whom three died. Two cases of Varioloid occurred in those who had had small pox in infancy, but in neither case could I find more than two or three pits caused by the first attack.

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The disease was first introduced into the settlement by an old Scandinavian, who arrived from his native country about September 20th, 1878, and was taken sick a day after his arrival. He died, and the neighbors not knowing the nature of his disease, called upon him while sick, and attended his funeral. Of the members of the four families (the one where he lived included) who visited him and attended his funeral, all contracted the disease with the exception of two women, who had been successfully vaccinated while young. One of the female patients was delivered of a child one week after rising from the fever. The child twelve days after birth developed Varioloid, and recovered.

As soon as it was known to the county authorities that Variola was prevailing in this locality, they sent a man who had had the disease, to the settlement, with orders to render the families any aid in his power; to communicate their wants to the authorities, and to prevent them from visiting with families who were not infected. They were effectually quarantined except in one instance, where a carpenter who had been at work on one of the infected houses, left the house as soon as he knew of the existence of the disease, and went to live with relatives. A few days after he was attacked with violent headache, nausea, pain in the loins and lower extremities, and high fever. These symptoms continued for two days, when they subsided, and he felt quite well and strong again. No eruption whatever appeared on any portion of his person. Two weeks after, two inmates of this house came down with discrete small pox. One other member was protected by vaccination, and the remaining one (age one year) was immediately vaccinated.

Dr. Simons informed me that he had applied vaccine matter to between three hundred and fifty and four hundred, and I applied the matter to about a like number. I drove from house to house in the neighborhood of the infected houses, and applied the vaccine virus to both those who had been previously successfully vaccinated, and to those who had not. In those cases where vaccination had been performed successfully (from two to sixty years previously) at least fifty per cent. were re-vaccinated successfully. Some of these re-vaccinations (and notably those who had been directly exposed to the small pox poison previous to re-vaccination) causing the patients to remain in bed for several days.

On December 3d, the disease not spreading, and the cases all convalescing, I left for St. Paul. Before leaving, I recommended to the County Commissioners that so soon as the scabs fell off from the patients, they shall have their clothing burned and their houses whitewashed inside and out. During my stay I caused the infected houses to be fumigated by burning sulphur and free chlorine gas.

The County Commissioners, and, indeed, every one, rendered me all the assistance in their power. I wish especially to thank Dr. James Davenport for his kind and immediate attention to my telegrams and letters.

Very respectfully,

Your obd't serv't,

JAY OWENS, M. D.

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VACCINATION.

EXPERIENCE IN BLUE EARTH COUNTY IN THE USE OF HUMANIZED AND NON-HUMANIZED VIRUS.

BY E. J. DAVIS, M. D.

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VACCINATION.

Experience in Blue Earth County, in the use of humanized and non-humanized Virus.

BY E. J. DAVIS, M. D.

Whenever a disease makes its appearance in a community in the form of an epidemic, it becomes the engrossing topic, and engages the attention of all, but especially members of the medical profession, and they manifest a deep interest in all questions pertaining either to its history, or statistical facts bearing upon it.

During the past eight years Mankato has been twice afflicted by an epidemic of small pox, and in each instance our city authorities have been able to trace directly its origin. The last of these occurred during the months of January and February of the present year. When the pestilence prevailed, our people, for the time being, seemed to feel the importance of vaccination as a preventive measure, and eagerly sought and obtained it. to the complete arresting of the disease. As a result of this, I was requested to obtain what statistical facts I could concerning its workings, and, accordingly, issued the following circular, confining my investigation to within a radius of thirty miles of Mankato:

"The extensive use of non-humanized vaccine virus during the prevalence of small pox in the city of Mankato and two or three other localities in Blue Earth county, during the months of January and February, 1878, has induced the State Board of Health to investigate its workings; and in order to accomplish this, I have been instructed to obtain statistical facts upon the following points:

1st. Number of persons vaccinated.

2d. Number of cases of first vaccination.

3d. Number of cases of re-vaccination.

4th. Number of failures in each class of cases, and the cause.

5th. Number of cases, if any, in which the vaccination produced unfavorable results; giving cause and a detailed report of the same.

Any suggestion which you may feel disposed to offer touching the important matter of vaccination, will be thankfully received."

We issued thirty of these circulars, and received replies from fifteen physicians, who report having vaccinated thirty-one hundred and four persons. As temporary

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agent of Dr. E. L. Griffin of Fond du Lac, Wisconsin, I distributed about three thousand points, mostly in this city and county; hence the above is but a small percentage of the total number of persons vaccinated; for in this city I report, approximately, three thousand, and fully ten in the county. The physicians at St. Peter, who report about a thousand vaccinations, obtained their virus direct from Dr. Griffin; also some here, and many in this section. The number of primary vaccinations reported by thirteen physicians, were thirteen hundred and ninety-five, with sixty-six failures, and re-vaccinations by same, eleven hundred and forty-one, with four hundred and four failures. I find that the result attending the use of virus, in the same class of cases and obtained from the same source, varies greatly in the hands of different vaccinators, and can attribute this difference to no other cause than to some defect in its introduction by him whose failures exceed those of his neighbors. One very clever gentleman states that, "in no case did I make more than one insertion," and by it, I apprehend, that he did not get a sufficient amount of the virus into the system to have it take; and to this cause would I attribute largely his lack of success. And another reason why two at least, better three insertions, for Flint says that "facts appear to show that the number of true vaccine vesicles has a decided influence on the amount of protective influence of cow pox." Another well informed gentleman states that "primary vaccination, when properly done, with fresh, non-humanized virus, seldom fails," and then gives the cause of failures: "First, the use of virus which has been kept too long; Second, too deep and imperfect scarifying; Third, too rapid drying by holding the arm over a lamp or near the stove," and thus drying it by evaporation instead of by absorption. Nearly all observed that it produced quite a marked systemic febrile action, and generally of a more active type, and continued longer than after the use of humanized virus.

I submit the following, which are all the reports that I have in answer to question five.

One gentleman, who performed about four hundred vaccinations, says, "that in some fifteen or twenty the arms became very painful, much swollen, of an erysipelatous appearance, extending from the elbow to the shoulder. An ugly ulcer was developed, discharging profusely, and finally followed by a large thin crust. Some of these cases were fully two months in passing through the effects." He does not intimate that probably there may have been in some, if not all, a scrofulous diathesis, or, possibly, a syphilitic taint. I conclude that they all recovered. Another, who vaccinated a hundred and eighteen, reports but one: "The vesicles spread and united, making rather a large scar, tardy in healing, and discharged a large amount of pus. It was a strumous case of a scrofulous family. Health much better at present writing than previous to vaccination." Another the following: "With one exception, there were no unfavorable results following any of the cases. In this instance an obstinate pustular eruption appeared as a sequel to vaccinia, in a young child, which gradually disappeared in a few weeks."

I submit, somewhat condensed, a report of the only case of another physician, who made a hundred and sixty-three vaccinations. A little four year old boy, son of a saloon keeper, had drank large quantities of beer every day for the past two years; was bloated, and had every appearance of a hard drinker; otherwise enjoyed good health. The arm appeared swollen, red and inflamed, from insertion of deltoid to near elbow, and discharged a thick ropy pus. I looked upon the beer as the cause of his trouble. It was stopped, and he soon recovered."

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Finally, I offer the only unfavorable case out of seven hundred reported by the asylum physicians: "An attendant had an immense abscess in the axilla, on the same side as the vaccination. He admitted that he had contracted syphilis six years before, but had been successfully treated, and had never developed any secondary symptoms. I am inclined to think it was a mere coincidence."

I dissent from the doctor's conclusion, and quote the following from Bumstead on this subject: "Vaccination with pure vaccine matter is sometimes the exciting cause of the appearance of syphilitic eruption in infants already under a syphilitic diathesis, in the same manner that it gives rise to non-specific eruptions in strumous subjects."

When we consider the fact that during an epidemic of small pox, vaccination is almost unavoidably done hurriedly, and, as in this instance, very generally resorted to, it is gratifying to know that it has been attended with so few, temporarily, unfavorable results, and reflects the highest praise upon the virus used.

We will make a few quotations from those who expressed a preference for either the humanized or non-humanized virus: "I much prefer that from healthy infants." "My experience with the non-humanized virus convinces me that it acts with greater violence than humanized, and that with adults and strong, healthy children its effects would be satisfactory, but in the case of feeble infants I should greatly prefer virus that had been modified by passing through healthy human bodies." "My own preference would be the non-humanized virus passed through one healthy babe." The remaining thirteen all expressed a preference for non-humanized virus, and many of them quite decidedly. The medical men of all shades in this city, are unanimous in their preference for the non-humanized virus, and are equally emphatic in their commendation of that obtained from Dr. Griffin; and by their action public sentiment has been so moulded that our people would not now accept any other, and speak equally as favorably of it as the profession.

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REPORT ON DIPHTHERIA.

BY FRANKLIN STAPLES, M. D., WINONA.

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OUTLINE OF THE GENERAL HISTORY OF DIPHTHERIA.

The history of diphtheria is not confined to modern times. According to Dr. Greenhow, of London, whose excellent monograph on this disease appeared in 1861, diphtheria prevailed in Spain, Italy, Sicily and other European countries, in the sixteenth and seventeenth centuries. It visited England, France, Italy, Sweden, Holland, Germany, and North America, about the middle of the last century. Oertel writes in Ziemssen's Cyclopedia: "Diphtheria is one of the oldest epidemic diseases of the human race. Even Homer and Hippocrates advanced views from which Bretonneau first sought to prove that the disease was known in those times under the name 'Malum Ægyptiacum', as a disease greatly to be feared." According to the same author, Aretæus, writing at the close of the first and the beginning of the second century after Christ, accurately describes the Malum Ægyptiacum, specially emphasizing the fact, that in the disease the tonsils are covered with a certain dense white "*humore*" which spreads over the tongue and gums. Writers in the later centuries give the disease under various names, and evidently confounded it with other malignant affections of the throat; yet the description of the character and situation of the local disease given by the older writers—the white, ashy and putrid exudation, in fatal cases so loathsome that even the patients themselves can not endure it; the disease often extending to the air tubes and causing death by suffocation; the class of persons most liable to the disease, children who have not yet reached the age of puberty; its uncertain attack and advance—all this affords abundant evidence that the disease of the ancients was identical with the diphtheria of our own time.

The name diphtheria was first given by Bretonneau, of Tours, France, in 1821. This distinguished Frenchman first made accurate investigations into the nature of the disease, and, because of its essential characteristic, the exudation, he gave it the name, in French, *diphtherite*, from the Greek, *diphthera*, a pellicle.

The investigations and views of Bretonneau were first published in the form of two treatises presented to the French Academy of Medicine. He at first insisted that diphtheria must be considered as wholly a local disease. He was obliged at a later period to concede that a blood poisoning is one of its essential characteristics—(Oertel.)

In 1820, Dr. Thomas Brown presented a paper on diphtheria to the Glasgow Medical Society, and in 1825, Dr. McKenzie published two papers in the Edinburgh Medical and Surgical Journal, in which views were expressed similar to what Bretonneau published the year following. It is true, however, that the medical profession at large, at this time and for many years afterward, had little knowledge and less practical interest in the disease, whose existence and character was known only in a few scientific essays.

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Almost all knowledge of the Malum Ægyptiacum of Aretæus of the first century, of the Garrotillo or Morbus Suffocans of Villa Real, Foutecha and Herrera of Spain, in the seventeenth century, the *sore throat* described by Chomel of France, and by Fothergil, Starr and Huxham of England, and by Samuel Bard in North America, in the middle of the eighteenth century, and even the *diphtherite* of M. Bretonneau, early in the present century, had passed from the memory of man, and the world for several generations had known little of diphtheria, when the great outbreak of the disease occurred at Boulogne in 1855. In this beginning of epidemic diphtheria of our own time, according to Dr. Greenhow, there were in Boulogne in the months of January, February and March, 366 deaths; 341 of which were of children under ten years of age. During the year, the disease appeared in various parts of France. The epidemic first appeared in England in the early autumn of 1856. The first cases were in the town of Spaulding, in Lincolnshire. In 1857 the disease was in London. Concerning the method of the progress of the epidemic, Dr. Greenhow remarks: "It is at least an important point in the history of the epidemic, to have ascertained that it began, to all appearances, spontaneously in several centers, sufficiently remote from one another to prove their complete independence. Another feature noticeable in the spread of the epidemic in London, as well as in other parts of England and on the continent, that has peculiar interest is, that the epidemic influence often produced its effect in various ways short of causing the complete and malignant forms of the disease. There was for some months previous to the introduction of what was regarded as true diphtheria, a peculiar sore throat prevalent, unattended either by ulceration or exudation, and scarlet fever prevailing about that time had unusual features as regards the character of the throat disease; there was an unusual depression of the vital powers. An epidemic of catarrhal fever prevailed in the autumn of the same year, almost exclusively limited to children; and this also was attended and followed by an unusual amount of depression.

The appearance and progress of the great epidemic in this country in 1861–62, is fresh in the memory of the great majority of those who will read this sketch. The constant existence of the disease in some parts of the country since that time, with now and then a fresh outbreak of an epidemic in different parts, are facts well known to us.

In closing this outline sketch of the history of diphtheria, I desire to quote briefly from a lecture by Dr. Alonzo Clark in the College of Physicians and Surgeons, New York, published in 1861, giving the opinion of the author concerning the future of the disease. Dr. Clark says: "I must now add that diphtheria, though an epidemic affection, is not, like cholera or yellow fever, a disease of a single season, at least so far as relates to a state or country. It often has a limited duration in villages and among a scattered population, but in large towns, and in the country at large, there is much reason to apprehend that, once established, it will continue for years. The great Spanish epidemic began in 1581, and continued to 1600. That of Italy which soon followed, first appeared in Naples in 1618, where it continued its ravages for twenty years. The disease described by Fothergill, Starr, Cotton, and Huxham, began in London in 1739, and was seen there more or less for seven years before it was seen in other parts of England, and was still witnessed in the smaller towns in 1753; having a duration of fourteen years at least. The Parisian epidemic of 1743, lasted at least five years. That in Sweden began in 1755, and was still raging when Wylke gave an account of it, ten years later. Dr. Jacob Ogden, of Jamaica, Long Island, writing in

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1769, out of 'compassion for the distressed people of Boston and Oxford,' speaks of the *malignant sore throat distemper*, as a disease he had been familiar with for twenty years; and again in 1784 his language implies that it still lingered in the country. It was between these dates, that is in 1771, that Dr. Bard published the paper relating to his rather limited experience in the Angina Suffocativa, or the sore throat distemper, as it is called by the inhabitants of the city and colonies of New York. * * * * * These statements can not fail to teach us that it is highly probable we shall not see the end of this visitation for years to come; that it will continue for the longest time in the largest towns; that for years it will be found in one or another of our towns and villages; and that in many of them it will recur more than once before the present epidemic constitution is replaced."

In the presence of facts such as these, two thoughts are suggested:

First. The great movements of epidemic diseases over the continents, their absence from all countries for long periods, their reappearance and prevalence for indefinite periods in different latitudes and climates, among people widely differing in habits of physical and social life, living in different degrees of civilization, afford abundant evidence that there are great and far reaching causes of such movements and of the existence of such diseases, which are above and independent of all local conditions and influences.

Second. Even the accumulated knowledge of modern times, however effectually it may be applied in overcoming the causes of disease which are local and accessible, may be able to do but little in devising means of resisting these great causes and influences affecting epidemic disease.

AN INVESTIGATION CONCERNING DIPHTHERIA IN MINNESOTA, BY DIRECTION OF THE STATE BOARD OF HEALTH.

In the month of October, 1878, a circular of inquiry was issued by a committee of this Board, and sent principally to reliable physicians, who have been longest resident in their various localities in the State. This, together with a large amount of personal correspondence, and some personal observation on the part of the committee in the towns which have suffered from the late epidemic of the disease, has been the means of bringing together the matter contained in this report.

The study of diphtheria in Minnesota was undertaken with two principal objects in view, the first of which was to obtain information concerning the character and comparative prevalence of the disease in the different localities of the State. Under this general head the circular presented the following topics and questions:

1. Concerning the origin and cause of diphtheria. Has it appeared spontaneously? If so, under what circumstances, and with what hygienic surroundings did first cases occur? Has it been known to be imported by contagion? If so, the facts concerning its introduction to a given locality.

2. Diphtheria as a *sporadic disease*—an account of the frequency and character of cases occurring in the various localities of the State.

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3. Diphtheria as an *epidemic disease*—the approximate dates of the beginning and end of the various epidemics, and account of their character, the statistics of fatality, &c.

4. Diphtheria as an *infectious disease*—the evidence showing that if care is not taken as to cleanliness, ventilation, the removal of expectorated matter, infected clothing, &c, the infective principle accumulates and renders the disease more active and more liable to spread. May the infection be carried through the air, and may it attach itself to solid matters and be communicated thereby?

5. Diphtheria as influenced by *external conditions*—climatic influence, nature and condition of the soil, moisture, miasm, the social relations and physical surroundings of families, the co-existence of other diseases, &c.

6. Diphtheria as affected by *internal* or *constitutional conditions*—nationality, age, sex, previously existing disease, the influence of the strumous diathesis and other disease tendencies.

7. The course and pathology of diphtheria—the character of the initiatory fever; the relation of the disease in the throat to the general disease; concerning what the microscope reveals in the diphtheritic exudation of vegetative sporuls, the different forms of bacteria, &c.; albuminuria; hemorrhages; relations between diphtheria and scarlet fever, and between croupous diphtheria and membraneous croup; concerning the *epidemic sore throat*, whether or not diphtheritic.

8. Concerning the *results* of diphtheria—the comparative fatality in different localities; the immediate cause of death in fatal cases; the sequelæ of diphtheria.

The second, and directly practical object of our study, has been to gain a knowledge of such facts concerning this disease as it has existed in the State, as bear directly or indirectly upon the important questions of the prevention and cure of the disease.

Of the fifty-three physicians whose correspondence was solicited, thirty-five have replied, and kindly furnished us with the material for much of this report. The following is a list of the names of those who have thus generously aided in the work:

Drs. E. J. Davis, Mankato; Z. G. Harrington, Mankato; A. W. Daniels, St Peter; D. B. Collins, St. Peter; D. W. Hand, St. Paul; C. H. Boardman, St. Paul; W. W. Sweney, Red Wing; S. C. McCormick, Duluth; Chas. Simpson, Minneapolis; Angus Macdonald, St. Cloud; W. H. Pratt, Stillwater; W. L. Lincoln, Wabasha; G. R. Patton, Lake City; F. H. Milligan, Wabasha; N. H. Hamilton, Minneiska; R. Walrath, Minnesota City; J. B. McGaughey, Winona; H. H. Guthrie, St. Charles; A. W. Stinchfield, Eyota; E. C. Cross, Rochester; H. Galloway, Rochester; John Flood, Mantorville; E. E. Bigelow, Owatonna; Geo. Wood, Faribault; H. L. Coon, Northfield; V. P. Kennedy, Litchfield; C. Gronvald, Norway; M. V. Hunt, Waseca; Chas. Berry, New Ulm; R. D. Barber, Worthington; A. C. Wedge, Albert Lea; R. L. Moore, Spring Valley; Thos. H. Everts, Rushford; J. B. LeBlonde, Brownsville.

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I.

HISTORY OF DIPHTHERIA IN THE STATE OF MINNESOTA.

Facts Observed Concerning the Origin and Cause of the Disease—Concerning the Times, Character and Localities of the Various Epidemics of the State—Diphtheria as a Sporadic Disease—As a Contagious and Infectious Disease.

In the following brief exhibit of diphtheria as it has existed in this State, either in the epidemic form or as a sporadic disease, since its settlement by a white population, the following line of localities will be taken: Beginning with the Lake Superior region in the northeast corner of the State, at Duluth, we shall thence come to the Mississippi River at St. Cloud; then down the river to Minneapolis and St. Paul, and to Stillwater; then going down the river, take the towns situated in the region of the bluffs of the river valley to Winona. Leaving the Mississippi at this point, we shall go westward over the great wheat-bearing portion of the State on the line of the Winona & St. Peter railroad to the valley of the Minnesota River, taking account of the towns in this region which have been the seat of the epidemic of 1878. Finally, we shall travel along the lines of railroad in the southern part of the State, taking the important towns in this section. It will be seen that the localities included in this outline embrace almost every variety of climate, soil, and surface exposure, that our State affords.

DULUTH.

Dr. S. C. McCormick writes: "You ask me to write up Duluth. Our physicians all testify that we have not had a genuine case of diphtheria in Duluth or in the surrounding country for the past eight years. This period embraces the time of the whole history of the town." This much for the Lake Superior region.

ST. CLOUD.

Dr. A. Macdonald observes: "A severe epidemic of diphtheria began here in the Autumn of 1873, and did not wholly disappear until the Spring of 1875. The first case that came under my notice was that of a child, aged about ten months, brought to my office by his mother. Upon examination, I found a well marked case of diphtheria in the advanced stages. The child, who was a member of a family of five or six, living huddled up in a small room in which they cooked and slept, paying little or no attention to cleanliness and ventilation, died on on the following morning. This was the first case of a general epidemic which spread over all the adjoining country, with no history of contagion or exposure

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to diphtheria. The epidemic continued about two years, was very fatal among children, being principally confined to them, sought the abodes of those who paid the least attention to sanitary rules, progressed very rapidly and was intensely contagious. The disease, which was in some localities preceded and accompanied by scarlatina and typhoid fever, was more virulent in winter than summer, and generally attacked all the children of a family.

MINNEAPOLIS.

Statistics of deaths from diphtheria in the city of Minneapolis from January 1, 1870, to October 31, 1878; furnished by Dr. Chas. Simpson, late Health Officer of Minneapolis:

		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total deaths from Diphtheria.	Total deaths from all causes.	Estimated population.
Old City.	1870.....	0	0	0	0	0	0	0	0	0	1	0	1	2	221	*13,066
	1871.....	0	1	0	0	0	1	0	0	0	0	0	0	2	215	15,000
	1872.....	0	0	0	0	....	....	....	....	....	....	....	....	0	73	.....
New City.	1872.....	....	....	....	....	1	0	0	1	0	0	0	1	3	340	25,000
	1873.....	0	0	0	0	0	0	0	0	0	0	0	0	0	405	27,000
	1874.....	0	0	1	0	0	0	0	0	7	20	11	14	52	609	30,000
	1875.....	5	3	4	2	6	4	2	3	3	8	11	1	52	561	†32,721
	1876.....	5	1	2	3	2	1	0	1	0	1	0	0	16	465	34,500
	1877.....	0	0	0	1	0	0	0	1	0	1	1	3	7	423	39,000
	1878.....	1	1	1	0	0	0	0	0	0	1	....	....	4	406	44,000

*U. S. Census. †State Census.

REMARKS.

The above figures answer a few of the questions asked in the State Board of Health circular on diphtheria. As I remember the facts connected with the epidemic of the fall of 1874: there was nothing to indicate *importation*. It commenced in a part of the city inhabited, mainly, by Scandinavians; and, while it spread through the whole city, it found the most victims in the district in which it originated. The topography of the locality referred to is not essentially different from that of the whole west side of the river—unless there is a greater flatness, and consequently worse drainage. The drinking water, at that time, was principally from shallow wells, consequently surface water. Cleanliness and ventilation are not, as a rule, as carefully attended to among the Scandinavians as they ought to be, and that may account for the relative greater mortality among that nationality, as well as for its first appearance among them. There was nothing, however, in the external conditions, sufficiently striking to point to any one factor as being instrumental either in originating or propagating the disease, excepting, perhaps, the season of the year. Cold weather seems to be a favoring condition.

CHAS. SIMPSON.

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SAINT PAUL.

The paper of Dr. C. H. Boardman, on Diphtheria in Saint Paul and Ramsey County, published elsewhere in this report, shows that no decided epidemic of this disease has ever existed in Saint Paul. The nearest approaches to an epidemic were in the autumn of 1864, when Dr. Samuel Willey is reported to have seen many cases, a number of which proved fatal; and in the spring of 1874, ten years later, when quite a number of cases occurred, but with few deaths.

Dr. D. W. Hand reports cases originating here, apparently spontaneously, under different and opposite hygienic surroundings, as follows: "In a cleanly family and in a good house in the city, German; in a small house, very hot and poorly ventilated, in the city, French; in filthy quarters in the city, Irish. Four children, German, in the town of Reserve, five miles from the city, were taken with the disease. The family lived in a damp basement room, and were very dirty. Three of the four children died.

"*Origin by Contagion*—J. Riley, aged four years, was visited by friends from Minneapolis, in whose family there were cases of diphtheria. The boy took the disease and died. There was in this case an apparent relation in character between it and the cases from which the contagion was supposed to proceed."

STILLWATER.

Dr. W. H. Pratt writes: "Diphtheria appeared here early last spring, without any probable contagion. The first cases, and in fact nearly all the cases for the first three months, were confined to the south part of the city. From the fact that this part of the city is high, the casual observer would conclude that it was the most healthful portion. Although high, there is no natural drainage here, there being a slight slope back from the river for some four or five hundred yards, forming a basin for the accumulation of miasmatic matter. The fact of the disease making its appearance in and being confined to this locality, can not be attributed to the filth of the inhabitants, as the disease made its appearance in and was, to a very great measure confined to the better class of people. The only reason we could give was improper drainage, for, although the people are of the best in the city, it is safe to say that five cases out of six have been in this locality.

The disease was much more fatal during the spring and early summer, taking a milder type on the approach of warm, dry weather. The soil in the vicinity of the disease is a heavy clay and the surface drainage is very imperfect, the basin before mentioned catching the water from the higher ground, and very probably generating a miasma.

The families affected include some of our most cultured and wealthy citizens. In connection with the disease, we have had an epidemic of typhoid and scarlet fever.

Diphtheria has been known to be imported by contagion.

In March I had a severe case of a little girl aged eleven. The membrane covered the entire tonsils. The case was a very obstinate one, the membrane sloughing and then reforming, and continuing to reform for two weeks. As soon as the child was able to sit up, two little children living three miles out of town, and away from the region of diphtheria, visited her. In ten days from the time of their visit, and within three days of each other, both were taken down with the disease, and presented types similar to the first patient. No children were

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allowed near the house while these children were sick, and the disease did not spread.

HASTINGS.

Dr. J. E. Finch reports: "Diphtheria has never prevailed as an epidemic in this locality. From 1860 to 1864, inclusive, an occasional case of the disease occurred, and then followed ten years of complete immunity from the complaint. In 1874 it reappeared, when we had a few cases rather malignant in character, and since then sporadic cases have been somewhat frequent here during the fall and spring."

Mr. W. came to Baytown in the summer from Iowa to escape the disease, which was raging in his vicinity. He had been there but a few days when a daughter, a young lady, was taken sick with it. In two weeks two other children followed with the same type of disease, also two children of a son of Mr. W. Three out of the five died; but great care was taken not to expose any other children, and the disease did not spread any farther.

RED WING.

Dr. W. W. Sweney, who has been a resident in Red Wing 26 years, and in the State 28 years, furnishes a full account of the disease as it has existed in the vicinity of this place. The paper of Dr. Sweney appears in Appendix "D" of this report.

LAKE CITY.

Dr. G. R. Patton reports that no epidemic of diphtheria has occurred in the vicinity of Lake City during the time of his residence there, a period of seven years.

The soil here is a sandy loam about sixteen inches deep, with gravel and sand subsoil. The water is hard. Limestone is reached at about 45 feet through the gravel. It resembles Winona as regards soil and water. The lay of the land is high, about 40 feet above the lake level, and drainage is good. There is scarcely any standing water anywhere here after the heaviest rains.

WABASHA.

Dr. F. H. Milligan: "I saw my first cases of Diphtheria in the winter of 1860, in the month of February, after a thaw, and when influenza was prevalent. The cases occurred among families poorly fed and clothed, living in poorly ventilated buildings with bad hygienic surroundings.

"I do not call to mind a single instance where the disease was known to have been imported by contagion. I have known some localities to be entirely exempt from the disease, while others suffered greatly; but in the localities where the disease most prevailed, imperfect drainage and bad ventilation were presumed to be the cause.

"The worst epidemic which I have known occurred in the winter of 1875, and was complicated by the existence of scarlet fever. The type was malignant. Out of seventy cases at least thirty-five were fatal. Hemorrhages were common in these cases. These cases occurred in a rural district in a population of about 400.

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"In summer I have seen quite a number of sporadic cases. These are always less to be dreaded than cases occurring in the epidemic prevalence of the disease."

Dr. W. L. Lincoln: "Diphtheria has never prevailed as an epidemic in Wabasha. It has appeared in sporadic cases at various times when there was no ground to allege a contagious origin, and when all the facts pointed to some local cause, though that cause was veiled in obscurity.

"In the winter of 1860, I saw a half dozen cases of well marked diphtheria in the village of Wabasha, and one case in each of three families in the county in different localities. In the spring of 1866 I saw three cases in one family. It was a well-to-do family, living in a comfortable farm house on the bluff two miles from the town, at a point where they did not lack for wind and sunlight, and where the natural drainage could not be well improved. The three cases all began within a day or two of the same time, and all died. There were other children in this family who did not take the disease, nor did the disease spread in this region at that time to any extent.

"The infectious character of diphtheria can no longer be denied, even by those who deny the truth of the "germ theory"—and the outlook is that the advocates of this theory are closing up their ranks. The reports in our State at this time (Nov., 1878,) not official, but in the funereal literature of the daily press, where lately the disease has prevailed, contains the evidence. Instance: 'The friends of Mr. and Mrs. ——— will deeply sympathize with them in their great bereavement in being called to part with their last child. Four of their children died about six weeks ago, and now little R—— has died of the same malady, leaving them childless.' This is but a sample of such literature in our own and in other States; not alone in the larger cities but in smaller cities, or what would be called in the east thriving villages. This may be a brittle thread on which to hang a theory of infection, but the facts point only in that direction. The opinion forces itself upon us that the infection, whatever it may be, can be carried through the air, for in every considerable village or city where it has prevailed, there must have been those who so secluded their children that there could be no other possible chance of contagion; and yet these children have been the victims of the disease."

MINNEISKA.

The little village of Minneiska, Wabasha county, is situated on the steep bank of the river; is really on terraces of the limestone and sandstone bluff, at a point where the bluff rises directly from the river. This bluff stands out to the river with wide ravines above and below it, so that marsh land and slough are in close proximity up and down the river. The village has a population of about three hundred.

Dr. N. H. Hamilton writes: "An epidemic of diphtheria began here June 10th, 1877, and ended in September of the same year. It was of a malignant character, nine deaths in twenty-six cases. It was confined to the German part of the population.

"The disease originated apparently spontaneously in several cases. The hygienic surroundings of the families were below the average. It has also resulted from contagion. October 17, 1878, a girl working in town was exposed to the disease; was taken sick, and when convalescent, went to her home, about four miles distant. In a few days, one brother and four sisters were taken with the disease, and three of their number died. From this family it was apparently communicated to the family of another brother, in which three had the disease,

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and one died. These were the only cases in the valley where the families resided. There was a similarity in character and severity in all the cases resulting from this contagion."

MINNESOTA CITY.

This is a small village on a table land partially covered with wood, at the mouth of the Rollingstone Creek, with the river bluffs in the near back ground. The village is built on the banks of a large mill-pond. From a quarter to a half mile below the village, the table land falls off to the wide marsh and bottom lands of the river.

Dr. H. Walrath reports diphtheria here in sporadic cases for the eight months to October, 1878: "In thirteen cases observed, it seemed to be apparent that the severity of the disease was in proportion to the virulency of the contagion, one type of disease being observable in all. While this was true, favoring or unfavorable circumstances were able to modify the disease, influencing towards a favorable or unfavorable result. In a large per cent. of the families attacked by the disease, where medical means effected the least and where the deaths were the most numerous, I observed that there was more or less drainage into the wells, from grounds upon which were thrown the refuse from kitchens, cellars and vaults."

WINONA.

The city of Winona has a population of a little more than 12,000, and is situated upon a wide river prairie of fine and coarse gravel, with high bluffs surrounding the place in the distance. The water supply is from driven wells in the deep gravel, and from the city water works, the supply to which is from large stoned wells dug in the gravel near the river. The city has never known an epidemic of diphtheria. The number of deaths from sporadic cases of this disease that have occurred here since 1870, as well as the whole number of deaths from all causes in each year, is shown in the following table:

STATISTICS OF DEATHS FROM DIPHTHERIA IN THE CITY OF WINONA, FROM JAN., 1870, to DEC. 1878, SHOWING THE MONTHS IN EACH YEAR IN WHICH DEATHS HAVE OCCURRED, THE NUMBER OF DEATHS FROM ALL CAUSES, AND THE ESTIMATED POPULATION IN EACH YEAR.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total deaths from Diphtheria.	Total deaths from all causes.	Estimated Population.
1870	....	....	....	1	3	2	....	....	....	....	....	....	6	222	10,000
1871	2	....	....	....	....	1	....	....	....	....	....	....	3	55	10,200
1872	....	....	....	....	....	....	....	....	....	....	....	....	0	207	10,500
1873	....	....	....	....	1	....	....	....	....	....	....	....	1	134	10,800
1874	....	....	....	....	....	....	....	....	....	....	....	....	0	180	11.000
1875	....	....	....	....	....	....	....	....	....	....	....	....	0	128	11,300
1876	....	....	....	....	....	....	....	....	....	....	....	2	2	153	11,500
1877	....	....	....	....	1	1	....	....	....	3	....	1	6	140	11,800
1878	1	2	2	3	3	1	....	....	....	2	....	....	14	148	12,000

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While the above is true as to the exemption of Winona from diphtheria, a comparatively short distance from Winona on the other side of the Mississippi, the region of the Trempeleau valley, Wisconsin, has been visited frequently, and for the past two years, almost continuously by malignant diphtheria. Along the line of the Green Bay and Minnesota Railroad from Marshland eastward, in the low, flat and marshy valley of the Trempeleau river, as well as on the somewhat elevated table lands of the low barren bluffs of this country, the disease has seemed to find a place in which to display its malignancy.

LEWISTON.

The village of Lewiston, in Winona county, is on the Winona and Saint Peter Railroad, and is the first station on the rolling prairie after ascending from the ravines among the river bluffs. It contains about three hundred inhabitants, almost exclusively German. The soil is the rich black clay loam which, in all this region, overlies the drift and magnesian limestone. The sanitary condition of the village is not good. The site is on a gentle slope of land, and many of the houses are so situated that the rear of the lots where are the barns and privies drain towards the dwellings. The privy vaults are neglected, and in a bad condition. It is a very muddy place in damp weather. The water is obtained from five stoned wells in the village, and from cisterns.

In the winter and spring of the present year thirty cases of diphtheria occurred in this village, of which eleven were fatal, seven boys and four girls. The ages of the eleven were as follows: 2 months; 1, 3, 4, 7, 9, 11, 11, 13, 16, 17 years.

It is known that the disease spread into the country in various directions.

ST. CHARLES.

Dr. H. H. Guthrie writes: "Diphtheria prevailed in and about this village in a somewhat severe form during a part of the winter of 1863–64, and again in the winter of 1864–65. The sporadic cases of the disease occurring during the next two years were milder and less frequent, and since then death has rarely resulted here from the disease. Death usually resulted from blood poisoning, and occurred in a few cases within twenty-four hours from the time of the first attack. The usual period of the disease in fatal cases was four or five days. A few cases lasted three weeks and then proved fatal. In one of these, that of a girl about four years old, there was destruction of the soft tissues of the throat and roof of the mouth and loosening of the teeth, and a number of days before death, a number of the teeth even fell from the mouth.

"The origin of cases occurring here has been obscure. A few cases of temporary paralysis occurred as sequelæ of the disease."

EYOTA.

In this village, and in the vicinity, between January and April, 1876, there were thirty cases of diphtheria, with only four fatal cases.

Dr. A. W. Stinchfield has the following on the contagiousness of the disease: "At a time when we were having no diphtheria within a radius of ten miles, a lady went to a remote part of the county to attend the funeral of a relative who had died of this disease. She there came in contact with others of the family then sick. In a week she had a severe attack of diphtheria. Her babe took the

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disease from its mother and died; the other remaining child had a severe attack, and several cases followed in the neighborhood. As to the question of the virulence of the contagion giving character and severity to the disease, in the above cases, in the family to which we trace the contagion, three out of five died. Those taking the disease direct from these malignant cases suffered more severely than in cases where the disease was contracted later in the little epidemic that followed.

ROCHESTER.

The city of Rochester has never suffered from any epidemic of diphtheria. Dr. E. C. Cross furnishes the following facts concerning diphtheria in the surrounding country: "About the middle of July, 1877, epidemic diphtheria in a malignant form occurred in Farmington, Olmsted county, as follows: A German farmer with his family, consisting of wife and two small children, lived on the southern slope of a rolling prairie, in a frame house of one room. Both children were taken sick with sore throat, and one died in about five days. A physician was called to the other child and found the sickness to be diphtheria. This child recovered under treatment. About the time the first child died, two children in a family of twelve, living one mile north of the first family, were taken down with malignant diphtheria. The disease broke out simultaneously in several other German families in the vicinity, one or two cases occurring in each family at first, but every child and youth from twenty-two years old down to infancy, in every family from where the disease first appeared to where it ended, was prostrated during the four or five weeks of its prevalence. Communication was forbidden and entirely cut off from the infected district. The disease did not spread to any family beyond those of the persons who assisted in taking care of the sick; but in every case where persons assisted the afflicted families, they conveyed the disease to their own homes. The number of deaths in this epidemic was one to every six cases. The families were all Germans, and all lived in crowded rooms, with piles of bedding and rubbish on every hand. The first cases here could not be traced to contagion.

"About the first of January, 1878, the only child, and this about five years old, in a well-to-do American farmer's family, was attacked and died of diphtheria. A neighboring woman, twenty-four years old, and her only child, three years old, both of whom had been with the sick child, had the disease severely, but both finally recovered. A servant girl, nineteen years old, working in the last named family, when the sickness occurred went to her home one-half mile distant, against the protest of the physician, and was herself dead of diphtheria five days afterward. Of the ten children in her family she was the oldest, and six of the ten died within three weeks of diphtheria. Of all their neighbors and friends, only one man and woman, the parents of four children, visited them. One of these children took the disease and died. The family then went to the house of a relative several miles distant, where two other of the children died, and a young man about twenty years old, the only young person there, had the disease severely but recovered. In this epidemic so far as appears, the first case originated spontaneously; but there is every reason to believe that the cases following it resulted from contagion. Of sixteen cases, ten were fatal. All occurred in houses of adjoining farms. No case occurred in the vicinity outside of these four families, and during the prevalence of the disease, no one except members of these families and the physician visited the infected houses. In the family which lost six children out of ten, all the family, the sick and the well,

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occupied one room. The house was on a hill-side high and dry, and the locality seemed a healthy one.

"In the spring of the present year, 1878, a family on the northern border of Mower county, living in an old log house, lost several members, including all the children, save a nice healthy boy of six years who had been kept at his grandmother's, several miles away, during the sickness at home, remaining there at least two months after the last death at his home. After that length of time he was taken home, and within ten days was dead of diphtheria.

"There can be no doubt of the infectious nature of diphtheria, nor that the infection may be carried in solid matter, in clothing, &c.; but there is much doubt as to whether the infection can be carried any considerable distance through the air."

Mr. John Stewart, living in the town of High Forest, Olmsted county, related to me the following facts concerning diphtheria in his own family: A young man came from Cummingsville, ten miles distant, to work in harvest for him. He told Mr. Stewart, that about a week before, his sister and brother had died of diphtheria, but that he had not had the disease. One week after the arrival of the boy, Mrs. Stewart was taken with diphtheria. The boy did not sleep in the house, but Mrs. Stewart had handled some of his clothing. She had a comparatively mild run of the disease. Mrs. Stewart had a nursing infant. One week from the time of the attack of the mother, the babe was taken sick, and died in fourteen days. Its throat was very much swollen, and there was a yellow exudation in it and bad odor. Within a week of the child's death, two hired men and a servant girl took the disease, but recovered. They were all well by the 1st of September. Mr. Stewart's little boy, who had happened to be away at his grandmother's during all the sickness, was brought home on the 20th of October. The child was at home one week, when he was taken with diphtheria, and died in a week from the time of the attack. No other cases occurred in the neighborhood. The Stewart family was at the time living in a log house.

DODGE CENTRE.

We are at this point on the Winona & St. Peter R. R. in a rich prairie and comparatively level country. This is the highest general surface on the line of this road between the Mississippi and the Minnesota rivers, this region forming the divide between the valleys of the two rivers. Diphtheria has never prevailed here. There have only been a few sporadic cases in the last seven or eight years.

OWATONNA.

Owatonna has suffered quite severely from the epidemic of this year. We have, however, been unable to obtain any history of the disease here, or the statistics of its mortality. Specimens of diphtheritic membrane obtained from malignant cases were kindly furnished for our examination by Dr. E. E. Bigelow, of this place. (See report of microscopic examination by Dr. C. H. Boardman.)

FARIBAULT.

Faribault and the vicinity has known only sporadic cases of diphtheria. Extracts from a valuable paper of Dr. Wood of this place will be given hereafter.

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NORTHFIELD.

Dr. H. L. Coon reports that in the winter of 1863, diphtheria, measles, scarlet fever and whooping cough all prevailed extensively in this region; that since 1864 diphtheria has been but little known until within the last two years, when there has been quite an increase both in the number of cases and in the severity of the disease.

Dr. C. gives the following history of cases: "Mrs. W. had been visiting in another part of the State where she saw cases of diphtheria. On returning home she came down with the disease and died within a week. Mrs. M., her aunt, was constantly with her neice during her sickness and until the burial. She contracted the disease and was quite sick. Her husband, his sister, two children and a neighboring boy, who had often been in the house, all had the disease, but recovered under prompt treatment. These were the only cases in the neighborhood. Mrs. M., while convalescing, in attempting to sit up had several spells of alarming syncope."

WASECA.

Sporadic cases of diphtheria, generally of a mild form, have occasionally been seen in Waseca, Janesville and vicinity, since the settlement of the country. These places have suffered to some extent from the epidemic of this part of the State during the past autumn. In our journey over the State we are now on the border of the Big Woods of Minnesota, and in the country drained by the Minnesota river.

Dr. M. V. Hunt contributes to our report, as follows: "In the epidemic of this year in and about Waseca, in several families the disease has appeared spontaneously where contagion was impossible. Four families lived in the country in different parts of the county. All of them were attacked with diphtheria within two days of each other. There was no communication between these families; nor was there any between them and their neighbors. The houses were built of logs and surrounded by thick, heavy groves of poplar and maple trees, which shaded them. The wells did not exceed fifteen feet in depth, and were, for the most part, filled with surface water, which had a decidedly unpleasant taste. The cellars of all the houses were damp and a part of the time contained water. In these cellars the winter's supply of vegetables was kept. There was no way of ventilating the houses except by opening the doors. Heaps of dung were everywhere about, and the houses were even banked with stable manure. The privy vaults were all above ground."

The following is a description of one of these first cases occurring in one of the houses above described. Dr. Hunt says: "I was called to see J. C.'s daughter, aged sixteen. She had been taken with a chill the night previous, which lasted four hours. She now had intense headache, slight nausea, and a bad diarrhœa. She complained of aching all over, and was drowsy. There was some sore throat, but not enough to give much trouble in deglutition. There was some swelling of the lymphatic glands below the jaw, and the tongue was coated. On examination, I found the fauces, palate and base of the tongue of a dark purple color, with some small spots of a peculiar yellowish white membranous deposit. This exudation increased so rapidly that in four hours, the throat had the appearance of having a large select oyster lodged therein."

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Note—In the recent epidemic at Mankato, St. Peter and Owatonna, the term "*oyster variety*" came to be a common expression in speaking of the more malignant cases.

Dr. Hunt gives a special description of the particular house in which the case above described occurred: "It was built of logs, sealed up within, and almost air tight. The room was damp, and a greenish mould appeared on the walls The ceiling was covered with mould, with here and there drops of dirty water, from condensation of vapor. A part of the winter's vegetables was piled on the floor, and the pile emitted an unpleasant odor. The well was twelve feet deep, and two-thirds full of surface water not fit for use. The privy vault was wholly above ground.

The patient was convalescent in about twelve days, but had a relapse which lasted seven days. Three days after this case had relapsed, two sisters and the mother came down. The recovery of the four was very slow.

"Mrs. A. was nursing a sister's child, and carried home with her, a distance of eighteen miles, a small hand-satchel with which the sick child had amused itself. Two of her children came down with diphtheria in four days, and the mother attributed the cause of their sickness to contagion from the satchel; the children having played with it after she had brought it home.

MANKATO.

The severe epidemic of the past year began in Mankato in the month of July. It was the first that has ever occurred here. The full account of this epidemic is contained in the paper by Dr. E. J. Davis, published as an appendix to this report —Appendix "A", and in the following observations by Dr. Z. G. Harrington. See also report of water analysis by Prof. Peckham of the State University, published in this volume.

Dr. Z. G. Harrington writes: "The disease first appeared here spontaneously; hygienic conditions not the best; want of cleanliness in and around buildings; soil wet. I saw the first cases July 15, 1878. The family lived in a poor house, not tidily kept. Refuse and slops were thrown out at a back door, and there was no drainage. The children had been sick about a week when I saw them, and two were at the point of death. Other cases soon followed, but generally in families living where the soil was wet, and amidst other bad hygienic surroundings. * * * *

"Cases showing the contagious nature of the disease have been numerous. When communicated by contagion the disease has sometimes taken the character of that from which it was contracted, but sometimes it has not.

"In nearly every instance where ventilation and cleanliness were neglected the nurses or others in the houses became victims of the disease, while in those families where the hygienic conditions were good and neatness a permanent feature, few adults took the disease while attending the sick.

"Sporadic cases of diphtheria have occasionally occurred here since my residence in the place."

ST. PETER.

For report of diphtheria in St. Peter and vicinity, see paper by Dr. A. W. Daniels, Appendix "B" of this report.

Dr. D. B. Collins gives the following account relating to the epidemic of 1878:

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"The cases first noticed occurred in a Norwegian family, consisting of the parents and eleven children. They lived in a small house near the edge of a large slough. The ground near, and, in fact throughout that entire section of country, is flat and full of pond-holes and small lakes. The children in this family were poorly clad, and they spent quite a portion of their time playing in and around the slough. One of the children complained of its throat "hurting," had a fever, and died on the fifth day. The other children were now sick, and the neighbors flocked to see the sick children. As a matter of fact, nearly every family whose members visited this family of sick children soon had one or more cases of diphtheria. The cases occurred in children who themselves had not been away from home. The disease was confined to children, not affecting the adults who had apparently conveyed the contagious principle in their clothing or on their persons to their homes. The most of the cases appeared in all parts of the neighborhood in about one week after exposure to the first set of cases. Complete isolation was now insisted upon; indeed, had it been an epidemic of small-pox instead of diphtheria, no greater care could have been exercised to prevent the further spread of the disease. The effect of this isolation was entirely successful, and the disease was limited to those families the members of which had been exposed to the contagion. The cases all occurred in families of foreigners. Americans who visited the same house, *i. e.*, that in which the first cases occurred, had no diphtheria in their families. This difference, the greater liability to the disease in the former class, can only be accounted for by the fact of their utter disregard of all sanitary laws.

"During the epidemic of diphtheria at Mankato last September and October, some persons living at Eagle Lake, distant about ten miles from Mankato, in the Big Woods district, went to Mankato to assist in the care of friends who were sick with diphtheria. After their return to Eagle Lake, cases of diphtheria occurred in their own families, among children who had not been away from home. With the exception of one young man, aged twenty-one, the patients were all under the age of sixteen years. The disease was confined to five German families and there were seventeen fatal cases.

"Mr. Conrad Schmidt who lives at Caroline Station went over to Eagle Lake to visit one of the families above referred to. A few days after his return home his daughter and hired man were taken sick with diphtheria. Caroline Station is twelve miles from Eagle Lake, and neither of the patients had been from home.

The cases were all of a severe character, and with but two or three exceptions, were among children.

"The fact has been observed, that in the epidemic of diphtheria through which we have passed this season, foreigners have appeared to be more susceptible to the action of the disease than Americans. My observation here is, that this is true of all infectious diseases. It may be accounted for in this locality by the habits of life and disregard of the rules of hygiene on the part of the former class."

NEW ULM.

Dr. Chas. Berry writes: "There have been two epidemics of diphtheria in New Ulm in the past seven years. The first was during the fall and winter of 1872–73, the last during the winter of 1876–77. Each continued four or five months. The first occurred in Nicollet county, across the river from New Ulm, and was con-

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fined to the towns of Lafayette and Bernadotte; the country there being low, flat and wet. The cases were severe, nearly one-half resulting fatally. It is a remarkable fact that there was at the time not a solitary case in New Ulm, although the people of these towns did all their marketing here. Scarlatina prevailed in the same district the following spring. The epidemic of 1876–77 was almost wholly confined to the townships in Brown county, the large majority of cases occurring in New Ulm. The type was croupous. I called it *diphtheritic croup*. I think there were at least 200 cases, with about 25 deaths. In this epidemic as in the other, the river seemed to be the dividing line.

"I recall but one sporadic case of diphtheria during the last five years: that of a young, robust farmer living with proper hygienic surroundings. He was taken sick at a time when there had not been a case of the disease in the vicinity for several months. The symptoms were marked and quite severe, and were followed by the sequel of partial paralysis of the muscles of the fauces, which at a later period, involved the muscles of the lower extremities.

WORTHINGTON.

Dr. R. D. Barber of Worthington, says: "I have seen each year a number of sporadic cases of diphtheria. During the past year I have had four well marked cases, all of them occurring spontaneously, no two of them in the same family or neighborhood. As far as I was able to ascertain the hygienic surroundings in three of these cases were about the average, but in one case they were bad.

"In nine cases out of ten, diphtheria is caused by filth or miasm of some kind. It is also induced by climatic changes, and occurs most frequently in the autumn or early winter months, or after an exceedingly dry and warm season following a very wet one, especially if the warmth is out of season. Such a season is most prolific of miasm."

ALBERT LEA.

Dr. A. C. Wedge: "In this (Freeborn) county, sporadic cases of diphtheria all over the county in 1860 and 1861; an epidemic in 1862; also cases in 1873 and 1874.

"It has been observed that diphtheria is not disposed to spread in this locality, which indicates that we have pure water and good hygienic surroundings. Even when the disease has prevailed in the country, we have had but little of it in the city of Albert Lea. In this county we have a very large Norwegian population, and I do not know that I ever heard of a case of diphtheria among them. When it has prevailed, it has been mostly among American farmers, and to some extent among the Germans.

SPRING VALLEY.

Dr. R. L. Moore: "Sporadic cases of diphtheria are occurring at the present time. I think not a year passes in which we do not see some cases.

"One epidemic of 1877 was from January 10, to Nov. 1. There were in the township twenty deaths from diphtheria in about 240 cases.

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RUSHFORD.

Dr. T. H. Everts writes: "In the autumn of 1862 there were a few malignant cases of diphtheria in this vicinity, since which time our observation of the disease has been confined to comparatively few cases, all but two occurring in a single epidemic which prevailed here a short time during the winter of 1876–77. In this limited epidemic the cases were very severe. One-half of those clearly diagnosed as diphtheria were fatal. A great number of simple *sore throat* cases recovered, both with and without treatment.

BROWNSVILLE.

This village is situated on the Mississippi river, in Houston county, near the southeast corner of the State. The topography of the village is given as follows: "It lies at the foot of a bluff 486 feet high, which rises from near the river. The village extends around the base of the bluff into a ravine. The business part of the town is twenty-five feet above the river, while that part situated in the ravine is thirty or forty. The soil along the river is sandy and lies on a sand rock, while back from the river it is more muddy. The village is principally supplied with water from wells; those along the base of the bluff furnish clear water, but the wells that have been dug in the ravine yield water unfit for use. Springs are quite numerous at the foot of the bluff, and these furnish the purest water. Large tracts of land north and south of the village overflow when there is much of a rise in the Mississippi. The country surrounding the village is broken bluff lands.

Dr. J. B. Le Blonde reports the village to have been entirely free of diphtheria for twenty-two years, but that in 1863 a very malignant form of the disease appeared in a little valley two miles from the village, and spread over the surrounding highlands. Dr. Le B. writes as follows: "The first case made its appearance in the latter part of July in a family consisting of six, the parents and four children. The disease originated spontaneously, contagion being out of the question, not one of the family having been out of the neighborhood. The house contained one room used for all purposes. The ventilation was poor and the hygienic surroundings very bad. The children all died. Other cases followed in rapid succession on the highlands, in a region of country about two miles east and west by six miles north and south. This was on the ridge land overlooking the river bottoms and valleys. In most instances the disease seemed to appear at different points spontaneously rather than to be communicated by contagion. Very few families had more than one room in their houses."

SUMMARY.

Duluth—Not a case in 8 years.

St. Cloud—Began in autumn 1873; continued till spring 1875. None reported since.

Minneapolis—Reports 1870–78, since which time it has not caused more than one per cent. of deaths, except in 1874, 52 deaths, 8.5 per cent.; 1875, 52 deaths, 9.0 per cent.; 1876, 16 deaths, 3¼ per cent.; 1877, 7 deaths, 1.6 per cent.

In 1874, 1 death in March; September, 7; October, 2; November, 11; December, 14. 1875—For 12 months: 5, 3, 4, 2, 6, 4, 2, 3, 3, 8, 11, 1. 1876—5, 1, 2, 3, 2, 1, 0, 10, 1, 0, 0. 1877—No deaths till April, 1, nor till August, 1; October, 1; November, 1; December, 3. 1878: 1, 1, 1, 0, 0, 0. 0, 0, 1.

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St. Paul—No decided epidemic. 1867, 1; 1871, 2; 1872, 3; 1874, 8; 1875, 9; 1876, 5; 1877, 2; 1878, 3.

Stillwater—Spring 1878.

Red Wing—1859 to 1863; greatest in 1862. 150 cases; mortality, 12 per cent. 1867, 5 deaths; 1870, 1; 1872, 3; 1878, 4.

Lake City—No epidemic in 7 years.

Wabasha—1860, 6 cases; 1875, February, 70 cases, 35 fatal in a rural district population of 400.

Minneiska—From June to September, 1877, 26 cases, 9 deaths.

Minnesota City—Sporadic for 8 months to October, 1878; 13 cases, deaths not given.

Winona—1870, 6 deaths in April, May, June; 1871, 2 in January; 1 in June. 1873, 1 in May; 1877, 1 in June, 3 in October, 1 in December. 1878, January, 1; February, 2; March, 2; April, 3; May, 3; June, 1; October, 2.

Lewiston—Winter and spring 1878. 30 cases; 11 fatal.

St. Charles—Some in winter of 1863–'64, and in winter of 1864–'65. Sporadic next two years.

Eyota—January and April, 1876, 30 cases; 4 deaths.

Rochester—No epidemic.

Farmington, Olmsted County—July, 1872, epidemic and malignant. Mortality 1 to 6.

Dodge Centre—Only a few sporadic cases in 8 years.

Owatonna—Severely suffered this winter, 1878. No statistics available.

Faribault—Sporadic.

Northfield—Winter of 1863, quite severe. Slight since 1864, till last two years, when it has been severe.

Waseca and Janesville—Sporadic till past season, when quite severe.

Mankato—Began in July of this year for first time. Still prevailing.

St. Peter—1862 first time. Sporadic since winter and spring. Present attack September and March, part of June. 100 cases, 14 deaths.

New Ulm—2 epidemics in 7 years. Winter 1872–'73; part 1876–'77.

Albert Lea—Sporadic all over county in 1860–'61, and in 1862. Cases in 1873–'74.

II.

DIPHTHERIA AS INFLUENCED BY EXTERNAL CONDITIONS.

"Diphtheria occurs in damp weather; usually in the autumn, sometimes in the spring. Cold has an influence. As to the question of the influence of miasm, if by this term malaria is meant, it is not probable; but if the term miasm may mean poisonous exhalations from filth and in crowded apartments, I should answer, yes. The disease, however, exists among people of all social conditions and with the most diverse surroundings." D. W. HAND.

"Diphtheria, according to my observation, is more fatal in winter. I saw cases, however, in Olmsted county in midsummer that were very fatal. I cannot attribute the cause to the existence of miasm. I have seen the most cases on the upland prairies. Last winter along 'Beef Slough' on the Mississippi river, quite a severe epidemic prevailed in houses that the south sun rarely penetrated, having damp cellars and poor ventilation." F. H. MILLIGAN.

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"We shall no doubt find that no climate is so sanative, that in it the disease may not prevail, and that no season of the year will prevent the spread of an epidemic once inaugurated; that, unlike yellow fever, it will not freeze out. My own experience in the disease would lead me to fear its prevalence in the spring of the year, but an epidemic once having gained a foothold in a given locality, might, regardless of the season of the year or of the climate, continue until the seeds of the disease had lost their fructifying power, or until the soil fitted for their growth had become exhausted, or, perhaps, until sanitary science had 'stamped out' the disease." W. L. LINCOLN.

"All of our cases have occurred during the summer and fall months. The condition of the weather did not seem to influence the character of the disease at all. This is a marshy locality, consequently there is here a large amount of vegetable decomposition. Malarious diseases are quite common. Six years ago the great majority of the inhabitants were down with ague. The families which were afflicted with diphtheria were below the average in social relations and physical surroundings." N. H. HAMILTON.

"Weather that is favorable to an excessive growth of vegetation may have something to do with the induction of the disease. Social relations have much to do with the severity and spread of the disease." M. V. HUNT.

"Diphtheria prevailed in a mild, open winter. Conditions of soil evidently were not concerned in the production of the disease. Cases occurred in the valley over dry, sandy soil and on the ridges elevated and perfectly drained.

"The first cases of the epidemic: three in one home, all fatal; social conditions low, and surroundings filthy; next, a case in a family of best class of Scotch farmers, with surroundings clean, airy and every way unexceptionable; but this family had visited the former during their sickness.

"Scarlet fever prevailed at the same time much more extensively than diphtheria. Roseola was also frequently observed. In one family of three children, one had scarlatina, slightly anginose, and recovered; one had scarlatina maligna, convulsion at the onset and was comatose until death; a third had a typical scarlet eruption and fever, with a deposit believed to be diphtheritic throughout the nasal passages, and died. In a neighboring house, fifty feet distant, two older children were taken sick at the same time. One case proved to be a typical case of scarlatina simplex, but very severe, the other well marked diphtheria—swollen glands, a deposit on the tonsils and fauces, with profound constitutional disturbance and manifest blood poisoning, and with no noticeable eruption on the skin. Both cases recovered, but the convalescence was more protracted in the diphtheritic case. Four other children were sick in the same house soon after with mongrel and not clearly defined symptoms of either disease. All recovered." T. H. EVERTS, Rushford.

"Some think that diphtheria was worse here after and during southerly winds. The soil has generally been wet where the disease has been the most malignant."
Z G. HARRINGTON, Mankato.

"The upholders of all theories meet on this common ground: that filth and moisture constitute an important link in the causation of disease—a link more easily broken, too, from the fact that it is known and accessible."—*Mass. State Board of Health Report for 1877.*

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"The localities attacked here have been mostly damp and marshy; the base and slopes of hills also seem to be favorite points of attack. Here I find, that, owing to the springy nature of the ground, the cellars of the houses are nearly always wet during a portion of the year."—*Mass. Report for 1877—Town of Malden.*

Compare the above with reports of Dr. Davis for Mankato, and of Dr. Sweney, of diphtheria in the vicinity of Red Wing, given in this report.

III.

DIPHTHERIA AS AFFECTED BY INTERNAL OR CONSTITUTIONAL CONDITIONS.

"Nationality has no influence; children under sixteen usually affected; sexes about alike liable; no relation to previously existing catarrhal disease, nor with the strumous diathesis." D. W. HAND, St. Paul.

"I think that strumous patients suffered more severely than those free from taint, but I cannot say that they have been more apt to contract the disease. In croupous children the disease was more dangerous, from an increased tendency in these cases to extension into the larynx, but not necessarily more severe as a disease, in its usual characteristics of a systemic poison."
W. W. SWENEY, Red Wing.

"No difference in nationality. I think that strumous children are more liable to the disease." F. H. MILLIGAN, Wabasha.

"There seems to be no evidence that the disease elected subjects suffering from catarrhal affections, and my observation does not suggest the strumous diathesis or other constitutional disease, as favoring the development of diphtheria."
W. L. LINCOLN, Wabasha.

"In our epidemic the cases were in German families; the ages in fatal cases were between five and ten years; the female sex suffered most; can not say that previously existing catarrhal disease had any influence. Children of a strumous diathesis are more liable to the disease than others, and in them it is more liable to end fatally." N. H. HAMILTON, Minneiska.

"My cases have been largely in American families; ages most liable, from three to fourteen years; sexes about equal in number; fatal cases have been mostly strumous children." A. W. STINCHFIELD, Eyota.

"Nationality has nothing to do with the susceptibility to the disease. Previously existing catarrhal disease aggravates and intensifies the local manifestation. In persons of a strumous diathesis, the malady is always intensified, and in a majority of cases proves fatal under the best care, blood poisoning being the characteristic feature." M. V. HUNT, Waseca.

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"My list of cases embraces Germans, English, Irish and Americans; more of the latter than of all others combined. In our village and township there are quite a number of Norwegians, as well as in the township south of us, this being their market place; yet it is a remarkable fact that not a single Norwegian had diphtheria.

"Females suffered more than males in about the proportion of five to three. Of twenty fatal cases three were adults." R. L. MOORE,
Spring Valley.

"Diphtheria is a children's disease. Females are more subject to the disease than males. The total number of deaths from diphtheria, in the United States, in 1859 (mortality statistics, census of 1860) were 1,662. Of this number 1,102 were under five years, and 560 were over that age. Of the 1,662 deaths 786 were males, and 876 females; and there is this curious fact, that under five years the males most frequently die of the disease; the figures being, under five years, deaths of males, 591; females, 512; over that age, males, 195; females, 364. R. D. BARBER, Worthington.

IV.

CONCERNING THE CAUSE AND PATHOLOGY OF DIPHTHERIA.

"Ordinarily there is not much initiatory fever; the exudation in the throat often being the first prominent symptom.

"My own impression is, that the disease of the throat bears the same relation to the general disease that the inflammation of Peyer's glands does to typhoid fever.

"I have found with the microscope undoubted bacteria, both the spheroid and the common. I cannot decide whether these are primary or secondary formations. Albumen has occurred in perhaps one-half of my cases; not always in the most severe. Hemorrhages have been more rare and only in the worst cases. There is no relation between diphtheria and scarlet fever, no more than there is between measles and variola. I suspect an identity between croupous diphtheria and membranous croup, but am not quite satisfied about it.

"Epidemic sore throat of a more or less severe form, usually prevails in connection with true diphtheria. No case should be considered diphtheria that does not present the thick, yellowish white membrane rather raised above the surface and surrounded by an inflamed areola. Pearl white ulcers over the tonsils having no areola are not diphtheritic." D. W. HAND.

"The disease always begins with fever and a sense of prostration, and with pain about the muscles of the throat and neck. The fever, however, is no indication as to the severity of the disease. In some cases which terminated fatally the initiatory fever was slight, and in others in which the fever was high, a quick recovery took place.

"In all my severe cases, when the membrane was slow in being thrown off, albumen was present in the urine.

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"Hemorrhages have usually occurred when the disease was complicated with scarlet fever. Diphtheria and scarlet fever are two diseases. The relation between diphtheria and membranous croup is more intimate; the location of the membrane, in my opinion, constitutes the only difference. Epidemic sore throat is less liable to result in diphtheria than is ordinary catarrhal inflammation; yet when epidemic sore throat is present in a community, diphtheria is at the same time apt to be present. I never call a case diphtheria unless I can see the characteristic membrane." F. H. MILLIGAN,
Wabasha.

"In most cases the invasion of the disease was gradual and insidious; but in a few the attack commenced with a decided chill followed by a high fever, the membrane generally making its appearance within twenty-four hours.

"I would say that diphtheria is a constitutional disease, and that the local manifestation is the result of the general disease. It has been my observation that the severity of the disease has been in proportion to the amount of exudation deposited; and in my opinion this fact is not inconsistent with the above view of the pathology.

"Scarlet fever and diphtheria may resemble each other in some respects and not be related in pathology. I believe membranous croup cannot be distinguished from croupous diphtheria, if it prevails during an epidemic of diphtheria.

"In simple epidemic sore throat (the diphtheria of the ignorant and dishonest) we have few if any fatal cases. It is a follicular pharangitis, and nearly every case yields readily to treatment or gets well itself. Our diagnosis should be based almost wholly upon the false membrane, taking care not to confound this with the changed follicular secretion of the spurious disease, which is not so extensive nor so tenacious." N. H. HAMILTON,
Minneiska.

"The differential diagnosis between true and spurious diphtheria I would make as follows: In true diphtheria fever and lassitude precede the exudation; in the spurious they do not. In true diphtheria we have a characteristic odor; in the spurious there is no odor. In true diphtheria the throat disease is very persistent and severe; in the spurious it is not. True diphtheria is apt to leave unpleasant sequelæ; the false does not." GEO. WOOD,
Faribault.

"The inference from observation is irresistible, that some general cause is operative in the production of sore throats with fever. Whether the general disease being grave (diphtheritic) the membrane is a result, or whether the absorption from that exudation makes the case diphtheritic, requires a differeni kind of observation and investigation than ours to determine. In the absence of demonstration the impression is strong that the local disease is only an expression of a deeper toxic impression from a common miasm; and that there is no other difference between the innumerable mild cases of sore throat and those distinctly recognized as diptheritic, than that existing between scarlatina simplex and scarlitina anginosa or maligna. Cases presenting continuous membranous exudation (not merely aphthous spots, however large,) upon the mucous surface, and developing grave symptoms of systemic poisoning—which such cases always do—we diagnose diphtheria; other cases, not. T. H. EVERTS, Rushford.

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As exceptional to the general rule we may have cases of diphtheria with but slight affection of the throat, but with severe constitutional disturbance with albumen in the urine and resulting fatally.

The following case reported by Dr. J. B. McGaughey, of Winona, is illustrative:

"I first saw the patient, a German boy living in Winona, aged nine years, on the evening of Sept. 17, 1878. This was the second day of his sickness. He had high fever with pulse at 120, and complained of sore throat. The appearance of the throat indicated only inflammatory action. There were elevated points and a slight ulceration over the surface of the tonsils. Iron and chlorate of potassa were given internally; carbolic acid and glycerine applied locally. I was to call the next morning, but the father reported the child better and thought the call unnecessary. Was recalled on the 22d and found what seemed to be small diphtheritic patches on the tonsils. The patient was not confined to bed. Quinine and Sulph. Carb. Soda were given in addition to remedies before prescribed. The father again reported the child better, and no visit was called for until the 29th, when I was informed that the boy was vomiting frequently. I found him dressed and sitting in a chair, but having the appearance of a little patient who might be recovering from a severe illness. Very little urine had been passed for 48 hours. A small quantity was obtained and gave a sp. gr. 1010, and revealed a large proportion of albumen. The appearance of the throat had not materially changed. The disease there was comparatively unimportant. An active catharsis was followed by some relief of the symptoms for a period of 48 hours, when the vomiting again became troublesome. Warm baths, diuretics, diaphoretics, and all other means used to eliminate the poison, to control the vomiting or to sustain the strength, were of no avail. Death occurred on the eighth of October, the twenty-second day from the invasion of the disease.

"The mother and sister of the little boy both had the disease, the sister being taken down the day of his death with severe initiatory symptoms, but both recovered.

Dr. H. Galloway, of Rochester, reports the following interesting case of diphtheria in an adult.

"Mr. O., aged 24 years, a farmer, full habit, robust and active. April 29, 1877, he was in Fillmore county, and stayed over night at a farmer's house where there had been, some six or eight weeks before, one or more fatal cases of diphtheria. On the next day but one, he felt slightly ill and continued to get slowly worse for eight days, when his throat became sore and the first suspicion of diphtheria was aroused. His home, near Rochester, was a well situated and neatly kept farm house. There had been no diphtheria in his neighborhood his only exposure to the disease being as above mentioned. He consulted me first on the 7th of May, when there was no difficulty in determining the nature of the disease. From this time on, he was under close observation and treatment, until his death, June 5th. A very manifest tendency to putridity characterized the whole course of the disease, and there was considerable tumefaction about the throat. There was a tough membranous exudation in the nasal mucous membrane, as well as in the fauces. The sloughing of this exudation in patches was frequent and its renewal constant during the first two weeks, after which time it disappeared entirely so far as could be seen. Great difficulty in swallowing, however, continued, so that nourishment and remedies were taken with pain and consequently in unsatisfactory quantities. About the tenth day of treatment pains as of rheumatism supervened, with swelling and tenderness of

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the joints—arthritis—including the tempore-maxillaries. This in turn was supplanted by complete motor paralysis of the lower limbs and by opisthotonos, This continued until death. At the beginning of the third week of treatment a hemorrhage occurred from the throat. This was repeated three days afterwards and again on the day he died. The last hemorrhage seemed to be the immediate cause of death, all symptoms having then for two days indicated a possible recovery."

The following points in the case are noticeable: A hale, vigorous young man contracted the disease by a single exposure; a return to an uninfected neighborhood, with none but the best surroundings, failing to affect its progress or modify its malignancy; its protracted course, from May 1st to June 5th, giving an unusual clearness to the consecutive steps in its progress; the appearance of the characteristic exudation over the throat and nasal membranes, its exfoliation and final disappearance; the general blood poisoning, as manifested in the arthritis; the spinal irritation and paralysis; the hemorrhages.

A brother of the patient, who watched over him assiduously during his sickness, was attacked with symptoms of the disease, which were successfully combatted with free doses of quinine. I had, myself, while attending the case, similar symptoms, sore throat, stiffness of the neck, &c., which I treated with quinine. Friends of the patient who were necessarily exposed to the contagion, were also advised to take daily doses of the same valuable drug. Of course precautions were taken against infection, by the ordinary means of a free use of fresh air and the speedy removal of all excretions to a distance from the house, and by the use of carbolic acid. No other case followed. My own experience in this and other cases has greatly strengthened my confidence in the use of quinine as a prophylactic remedy in diphtheria."

ROCHESTER, Dec. 13, 1878.

In reports concerning what has been the ordinary form of diphtheria in the severe and fatal cases occurring in the different epidemics of the State furnished by Drs. A. W. Stanchfield, of Eoyta, J. B. LeBlond, of Brownsville, E. C. Cross, of Rochester, John Flood, of Mantorville, M. V. Hunt, of Waseca. D. B. Collins, of St. Peter, Geo. Wood, of Faribault, Z. G. Harrington, of Mankato, Chas. Berry, of New Ulm, R. L. Moore, of Spring Valley, and others, descriptions of the character and causes of the disease have been given. The following is a summary of these descriptions:

In most severe cases of diphtheria there is some constitutional disturbance at first. In some epidemics the severity of this initiatory fever will indicate that of the subsequent course of the disease; but this is not always the case, and in some epidemics it is the exception rather than the rule. Indeed, the insidious character of the period of invasion, has been mentioned as a diagnostic mark between diphtheria and scarlet fever. There are cases with a high fever, but in which only a moderate amount of exudation shows itself. The fever, when it exists, is sometimes ushered in by a chill, but frequently no chill is observed. There is general *malaise* and aching all over the body. The throat becomes painful and the glands behind the angle of the jaw begin to swell, and, in a period of time from 12 to 24 or 36 hours from the first symptom, the exudation makes its appearance in the throat. Dr. Hunt says: "Out of thirty-eight cases, in thirty-one the

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first deposit was on the right tonsil, thence gradually spreading to the left tonsil, the soft palate and the posterior part of the pharynx. Dr. Harrington and most correspondents believe that clinical observation shows plainly that the disease of the throat is only a local manifestation of a general disease. Nearly all cases show symptoms more or less severe prior to any diphtheritic deposit in the throat. In the early stage of severe cases there is catarrhal irritation. The eyes are red, and the mucous membrane of the nose swollen. The tongue is heavily coated and there is often nausea. The pulse varies according to the age of the child, but is not as high as in the corresponding stage of scarlet fever, and the temperature, although increased, is at least two degrees less than what we find in a severe case of the latter disease, varying from 100 to 104.

In severe cases, the disease in the throat soon becomes the principal source of suffering and often of danger. There is seen a dirty white exudation on a livid and sometimes purple, swollen mucous membrane. The mucous membrane around the great irregular patches of this whitish, leathery exudation swells, and in malignant cases, has a kind of œdematous appearance, with sametimes a transparent filmy covering. I observed in malignant cases in Mankato, an appearance resulting from the diphtheritic exudation and the œdematous swelling of the mucous membrane, which strongly resembled a large raw oyster. It was as if a large select oyster was partly imbedded in and partly hanging from the soft palate, the pillars of the fauces and the posterior walls of the pharynx. The doctors had learned to designate cases in which the throat presented this peculiar appearance, as the 'oyster' variety. These cases are almost necessarily fatal. The voice becomes nasal, deglutition is generally (not always) difficult—the difficulty due not so much to obstruction in the fauces, the pharynx or œsophagus, as to the painful action of the muscles of deglutition. The odor of the breath is now peculiarly offensive, "sickening." There is a shrinking of the tissues; the face has a peculiar pallor, and there is the hectic of malignant septicæmia. The pupils are dilated oftener than otherwise; the pulse soft and rather frequent. Albumen exists in the urine in rather over half the cases, but is not, of itself, necessarily an alarming symptom. The hemorrhagic tendency is present in a smaller per cent. of cases, and is a grave indication. Dark blood is often discharged from the nasal mucous membrane and may flow from the mouth and throat. The little patient will often lie with the mouth open, and the putrid or sanious secretions will flow from the open mouth. There are few sights more painful to be seen, even by those who are accustomed to scenes of sickness and death, than that of a little sufferer about to die of malignant diphtheria. With all that is so offensive to the eye and to the sense of smell, there is a constant demand for sympathy and aid in the anxious and imploring looks, and sometimes, in the audible expressions of the child. I visited a sick room in Mankato, with Drs. Warner and Davis, in October last. The patient, a little girl, would answer to the description which I have just given. She could hardly close her mouth, so great was the swelling within and about the throat. She was restlessly throwing her body from one side to the other of the bed. As we entered, her large, glaring eyes caught sight of her doctor, and she hastily said to him with a thick and husky voice, "Doctor, make me well!" and then threw herself a little towards the other side of the bed, and was dead.

After a few moments we looked in the throat of the dead child. There was the oyster-like swollen mucous membrane with a large mass of ashy exudation partially sloughing off from the raw and bleeding surface. I obtained a portion of this, and on microscopic examination it was found to contain immense numbers of bacteria.

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V.

MICROSCOPIC EXAMINATIONS OF DIPHTHERITIC EXUDATIONS.

REPORT OF EXAMINATIONS BY C. H. BOARDMAN, M. D.

SAINT PAUL, NOV. 25, 1878.

Franklin Staples, M. D.:

DEAR SIR:—In accordance with your request I have made microscopic examinations of several specimens of diphtheritic membrane, and herewith transmit a report of the result. The specimens were obtained from the following sources:

No. 1—From a child in Owatonna;* it comprised portions of a pulpy membrane from the tonsils and a much tougher piece from the trachea.

No. 2—Tracheal membrane from a child in Mankato.†

No. 3—Tonsillar membrane from a case in Whitehall, WIS.,‡ after three days illness. The patient was a girl of twelve years.

No. 4—Was from St. Peter,‡‡ and is designated "tracheal membrane from a case of croupous diphtheria."

As these all resembled each other in every essential particular, I will describe only the appearance of No. 1 in detail, adding subsequently an account of such modifications as were observed in the remaining specimens.

There was no material difference between the structure of the tonsillar and tracheal membranes which I have called No. 1, save that the latter was of much firmer and more leathery consistence than the former, which was loose in texture and quite pulpy.

The most noticeable feature of both, as revealed by the microscope, was the immense preponderance of the cellular elements in their composition. Of the cells by far the largest portion were micrococci; the spherical bacteria. A certain number of the rod-like bacteria (b. termo) were observed, but they were comparatively few. No other fungus, neither the oidium albicans or the leptothrix buccalis was observed, though diligently searched for.

In addition to these elements, large epithelial scales were found in quite large numbers, most of which had been invaded by the micrococci which were embedded in them.

Granular and pus cells also existed in abundance, together with a few blood corpuscles. The cellular constituents were well displayed by the addition of a weak aniline solution or a much diluted tincture of iodine.

*Specimen furnished by Dr. E. E. Bigelow.
†Furnished by Dr. E. J. Davis.
‡Furnished by Dr. R. G. Floyd, Whitehall, Wis.
‡‡Furnished by Dr. A. W. Daniels, St. Peter.

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Acetic acid (No. 8) developed a well marked fibrillated structure in certain parts of the membranes; the various kinds of cells being entangled in its meshes. In other portions the fibrous element could not be made out; the entire substance seeming to be composed of a homogeneous substratum and innumerable cells. A transverse section exhibited epithelial cells, granular bodies and micrococci at or near the surface; the membrane at this point appearing nearly or quite homogeneous. As the mucous membrane was approached the number of these elements diminished, and their places were taken by pus cells and blood corpuscles, the membrane at the same time assuming a more distinctly fibrillated structure.

In No. 2, with the same general appearances, there was a somewhat larger proportion of blood corpuscles, and some oil globules were found.

In No. 3 the only apparent difference between it and the others was a larger number of the bacteria termo.

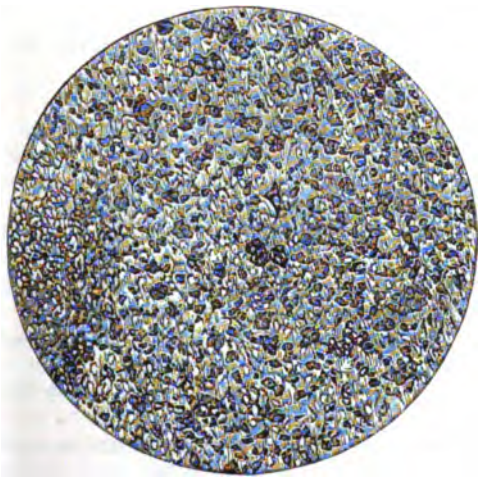
No. 4 resembled No. 1 very closely. The objectives used were a one-half and a one-fifth.

C. H. BOARDMAN.

REPORT OF EXAMINATION BY PROF. I. N. DANFORTH, CHICAGO.

Dr. Franklin Staples:

DEAR SIR;—Sometime in December last I received from you a specimen of diphtheria membrane, with the request that I would examine it microscopically, have a camera drawing made to illustrate the microscopic appearances, and procure engravings of the drawing. The membrane was quite a typical one of the "oyster-like" variety of the disease, and the history of the case showed that it came from a genuine case of diphtheria.*



*This membrane was kindly furnished by Dr. E. J. Davis, of Mankato, and was taken from a case occurring under his observation.

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The accompanying wood cut was made from a camera drawing from the specimen magnified 450 diameters. The same specimen was studied with higher and lower powers, and the appearances were substantially the same, so far as concerns the number of objects seen. The cut shows very faithfully the actual appearances presented under the microscope, and the specimen drawn is a faithful reflex of all others which we examined. Concerning the microscopic appearances, I have to say:

1st. We found no micrococci at all; nor are they very generally present in diphtheritic exudations, according to my experience. I should say that not more than half the specimens I have examined heretofore have contained micrococci. We found no bacteria of any variety.

2d. There was an intercellular substance showing indistinct or incomplete fibrillation.

3d. A great number of small plastic cells, or "bioplasts"—probably young (undeveloped) epithelial cells—and leucocytes or their progeny.

4th. Half developed epithelial cells, pushed off or exfoliated before attaining complete growth.

5th. A few fully developed epithelial cells; these several elements being held closely together by the intercellular substance already alluded to. In other words, the diphtheritic membrane consisted of the ordinary products of *diphtheritic* inflammation, as contra-distinguished from croupous or catarrhal inflammation. When bacteria, or other low organisms are present, they are accidental and not specific.

I. N. DANFORTH.

CHICAGO, January 31, 1879.

VI.

CONCERNING THE FATALITY AND RESULTS OF DIPHTHERIA IN MINNESOTA.

St. Paul.—"The mortality here has been about 25 per cent., and death has resulted generally from asphyxia but sometimes from blood poisoning. I have seen during apparent convalescence a sudden failure of the heart's action and death. I have seen both general and local paralysis result from diphtheria, and have known chronic albuminuria to result in three cases." D. W. HAND.

Minneiska.—"Of the epidemic of 1878, there were nine deaths in twenty-six cases. Of these every case but one was from blood poisoning. I have seen several cases of general paralysis and of local paralysis of the muscles of the vocal organs. In one fatal case there was paralysis of the muscles of respiration and of the heart." N. H. HAMILTON.

Minnesota City.—"Out of thirteen cases four deaths occurred. The longest period of sickness was eight days, the shortest four days. The first case, that of a child three years old, died from asphyxia; the other three died from septicæmia, one having obstinate epistaxis." R. WALRATH.

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Waseca.—"In all the fatal cases I have seen, death has resulted from blood poisoning. Death in one case occurred suddenly after a convalescence of two weeks." M. V. HUNT.

Rushford.—"Fifty per cent. of cases of true diphtheria have proved fatal. Blood poisoning has seemed to be the chief element in all, and in several the sole cause of death. The principal sequela observed has been the paralysis of the optic and glosso-pharyngeal nerve." T. H. EVERTS.

Mankato.—"A child ten years old had diphtheria severely; the throat became clean, the appetite good; she digested her food well and seemed well, except that the action of the heart was weak and she did not feel strong. She was directed to take rest, a generous diet and strychnia and iron. One morning, feeling unusually well, she had been at play, and running into the house she said to her mother, 'I feel so tired,' and immediately died."

"Prof. T——, of this city, had a severe attack of diphtheria in December, 1876. Soon after recovery his speech became thick, somewhat like that of a drunken man, and he had some trouble in swallowing; his arms grew weak and it troubled him to write; his legs refused to obey his will, and, although looking perfectly well and eating and drinking as well as ever, he could only walk by the use of two canes. He could not raise his foot up the step of his office door, and if his foot hit against any small obstacle he would fall and could not arise without assistance. Strychnia and iron were taken. He recovered perfectly."

Z. G. HARRINGTON.

STATISTICS OF DEATHS FROM DIPHTHERIA AND OTHER ZYMOTIC DISEASES IN MINNESOTA.

Table showing the number of Deaths from each specified Death-cause in the year ending December 31, 1876, with Age and Sex of the persons deceased.

ZYMOTIC DISEASES.	Male.	Female.	2 and under 2.	2 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80 and over.	Unknown.
Diphtheria	189	190	168	95	67	32	3	4	....	2	2	....	2	4
Scarlatina	183	179	151	88	73	26	14	3	....	1	2	....	....	4
Measles	31	40	41	8	5	6	6	1	....	1	1	....	1	1
Quinsy	11	9	10	5	2	....	....	1	....	2	....	....	....	....
Croup	75	59	84	37	9	1	....	....	....	....	....	....	2	1
Whooping Cough	48	57	98	3	....	....	....	....	1	....	....		....	3
Typhoid fever, Enteric	129	121	33	13	20	20	30	52	28	16	12	11	6	9
Erysipelas	17	16	9	2	2	2	...	4	5	4	3	1	1	....

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Table showing the number of Deaths from each specified Death-cause in the year ending Dec. 31, 1877, with the Age and Sex of the persons deceased.

ZYMOTIC DISEASES.	Male.	Female	2 and under 2.	2 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80 and over.	Unknown.
Diphtheria	180	190	134	75	102	33	11	7	2	..	2	1	...	3
Scarlatina	113	104	93	49	39	22	7	1	4	1	1	....	....	....
Croup	78	55	73	36	22	2	....	....	....	....	....	....	....	....
Whooping Cough	56	74	112	9	8	1	....	....	....	....	....	....	....	....
Measles	10	10	3	4	6	2	3	2	....	....	....	....	....	....
Typhoid Fever	139	116	18	13	28	29	44	52	24	14	14	10	3	6
Erysipelas	19	11	5	1	2	2	1	2	5	1	5	2	3	1

Table of Deaths from specified diseases, Zymotic Class; Percentage to total Deaths, and Percentage to Class.

ZYMOTIC DISEASES.	Deaths in 1877.	Percentage to total Deaths.	Percentage to class.
Scarlatina	217	3.28	12.27
Diphtheria	370	5.66	20.92
Croup	133	2.01	7.52
Whooping Cough	130	1.97	7.35
Typhoid Fever	255	3.86	14.42
Cholera Infantum	279	4.22	15.21
Spotted Fever	44	0.66	2.48

Total number of deaths in the state from all causes in 1877, 6,537; total population of the state, 700,000 (estimated.)

Table of Deaths from specified Zymotic Diseases from 1870 to 1877 inclusive.

ZYMOTIC DISEASES.	1877.	1876.	1875.	1874.	1872.	1871.	1870.
Diphtheria	370	379	226	236	41	62	63
Scarlatina	217	362	265	253	261	335	238
Measles	92	71	86	38	38	19	97
Croup	133	134	125	87	60	68	70
Whooping Cough	130	105	54	157	102	8	103
Typhoid Fever	255	250	216	326	315	417	274
Erysipelas	60	33	33	31	23	14	14

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VII.

CONCERNING MEANS OF PREVENTING THE SPREAD OF DIPHTHERIA—HYGIENIC AND MEDICINAL.

Sixteen of the correspondents who have aided in furnishing material for this report, begin their remarks under this head with the following words: *Cleanliness, Ventilation, Isolation.*

"The only means to prevent the spread of the disease are hygienic measures, with isolation. I doubt whether any remedy has specific prophylactic properties, yet we are using the preparations of chlorine, sulphur and sulpho-carbolate of soda."—The Mankato epidemic. DR. HARRINGTON.

"To prevent the spread of the disease I would urge the destruction of all decaying organic matter about the premises, such as old straw, hay, chip dirt and rotting manure. Avoid water for drinking and culinary purposes taken from wells contiguous to these beds of disease. Insist upon complete drainage, and that all cess pools and cellars be thoroughly and frequently disinfected."

DR. WOOD.

"Too much cannot be done in the isolation of cases of the disease, and in quarantine for those who have been exposed. Should a case develop in a school room, the inmates of that room should not mingle with those of another room; and should a second room afford a case, it would be well to suspend the school for a period. Disinfectants should be used, more than is now the case, in all public buildings, even when no epidemic prevails; and whenever and wherever diphtheria has developed, they should be distributed with an unsparing hand."

DR. W. L. LINCOLN.

"Quarantine all families affected against all persons under twenty-one years of age." DR. N. H. HAMILTON.

"Attendants should avoid the contact of all clothing and everything on which may be lodged any excretion or expectorated matter. All who are not needed should be kept away from the sick room. There should be no public funeral. There should be a large supply of pure air at all times, and perfect cleanliness should be insisted upon." DR. A. W. STINCHFIELD.

"Thymol in solution, carbolic acid, chloride of lime and solution of the chloride of soda have been used and are valuable; but the only effectual means of preventing the spread of epidemic diphtheria, is to stop all communication between the places of abode of the sick and the well." DR. E. C. CROSS.

"Insure perfect ventilation in the houses, cut down all rank vegetation and trees that prevent the sun from shining in and around the houses at all hours of the day. Insist that every objectionable thing be removed from cellars, and that they be made perfectly dry. At no time should water from a shallow well be used. This, in my opinion, is the source of the malady in a large number of

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cases. When diphtheria has attacked one member of a family, I have always put the remainder of the family on a treatment with chlorate of potassa, iron and quinine, or sulpho-carbolate of soda." DR. M. V. HUNT.

"Good warm clothing as a safeguard against the effects of atmospheric changes. Caution against sudden cooling after unusual muscular exercise." DR. W. W. SWENEY.

In the matter of danger from exposure to cold, Dr. R. L. Moore expresses the opinion that diphtheritic croup was almost invariably caused, by the patient, while suffering from the milder form of diphtheria, being exposed to cold air admitted in the efforts made to ventilate the room in which the patient was confined. He says: "I was in the habit of shutting up my patients in pretty close rooms, where I could have the temperature at all times about the same, thus choosing to take the chances between an accumulation of the infective principle and the danger of the croupous form of the disease."

Dr. Sweney gives a tonic containing iron and cinchona to the well ones of a sick family; also to those of the immediate neighborhood during the prevalence of the epidemic influence.

VIII.

CONCERNING THE HYGIENIC AND MEDICINAL TREATMENT OF DIPHTHERIA.

We cannot attempt to present here the details of the treatment of diphtheria as given by our correspondents in this investigation. Our study and this report, however, would come short of the practical good at which we have aimed, if we should fail to give at least a summary of what seems to be the most valuable of the remedial measures now employed in the treatment of this disease. We shall notice only such means as have what may be called the united support of the more intelligent and most experienced of our observers.

First. The fundamental truth, almost unanimously admitted, is that diphtheria is a disease of debility; that in it the blood becomes devitalized, and that septicæmia results and is the important pathological lesion, in all cases that do not terminate fatally by asphyxia from the mechanical obstruction of the exudation in the air passages before all the blood changes have taken place.

Secondly. There is also great unanimity on the question of a specific poison as the first cause of the disease. There is difference of opinion as to the exact physical nature of the poison, how it is received, and in what manner it performs its work of evil in the system. There is, however, less difference of opinion concerning the best means of destroying this poison and of counteracting its effects in the system after it has found entrance there.

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Our efforts are to be directed as follows: *first*, to destroy the poisonous principle, or as much of it as possible, before it shall have gained access to the system; *second*, to neutralize it and make it as inoperative as possible while it may exist in the system, whether on the respiratory mucous membrane, in the alimentary canal, in the blood, or in the tissues; *third*, to sustain the vitality of the system, and to aid nature in resisting the disease and in maintaining life. How these indications are to be met will appear, in brief, in the following quotations and observations:

"The treatment of diphtheria at the present time, consists, first, in attention to the hygienic surroundings of the patient; the light, the air, the temperature, the clothing, the food, and thoroughly disinfecting all expectorated matter and other discharges. For the latter purpose, I use chloride of lime or carbolic acid. When there are any croupal complications, the inhalation of the vapor or steam of lime-water—steam made in the process of slacking quicklime—is useful. I give iron and quinine in full doses; also alcoholic stimulants and nourishment.

"As a local application, I have used powdered persulphate of iron, which is blown into the throat by means of a tube, or it may be moistened with water and applied by means of a camel's hair brush. The local application of solutions may be effectually and easily made by means of the hand atomizer with a long curved tube." DR. D. B. COLLINS.

"The depressing nature of the disease would lead me in the future as in the past, to rely largely upon a pronounced tonic treatment, and upon antiseptics locally. The bitter tinctures of cinchona, quassia and gentian have been my favorites. If Prof. Chapman's theory should prove to be well founded, we could refer the good results of those remedies to the alcohol of the tincture rather than to the vegetable bitters." DR. W. L. LINCOLN.

"Insist upon perfect ventilation. If the initiatory fever is high, control it by means of baths or the wet pack. I think the sheet anchor of treatment in this disease is alcohol; next quinine and iron. In proportion as there is heat and swelling about the neck, I use pounded ice internally and externally to the neck and throat. I have seen better effects from the use of alcohol than from any one and from all other remedies together. Use the preparation of the spirit that agrees best with the stomach, but by all means have the article pure. The system while suffering from the diphtheritic poison will tolerate large doses of the alcholic stimulus, and to have them often repeated."

DR. N. H. HAMILTON.

"My treatment is quinine, iron and stimulants early and often."

DR. F. H. MILLIGAN.

"The saturated solution of chlorate of potassa with a little belladonna and hydrochloric acid combined, both internally and locally. The tincture of iron and quinine are valuable." DR. E. C. CROSS.

"The internal use of aromat. sulph. acid in such doses and frequency as the stomach will bear. Brandy and quinine *ad libitum*. Locally, gargles of carbolic acid, potassa chlorate, myrrh, chlorine mixtures, nitro-muratic acid and port wine or chloral hydrate and glycerine." DR. GEO. WOOD.

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"In no disease is there greater need of courage and vigilance. Strike earnest, vigorous and rapid blows. Don't give a little dose of chlorate of potassa or of sulpho-carbolate of soda every three hours, and then when your patient dies between the second and third dose, ascribe it all to Providence and the malignancy of the disease. Remember you are in the face of a disease of moments rather than of hours and days. Give your patients your best remedies every half hour, and for eighteen hours out of the twenty-four. Don't give any opium. Spray and gargle the throat, but don't use the swab nor forcibly detach the membrane. For gargling or spraying, pretty strong solutions of chloral hydrate stand at the head." DR. R. L. MOORE.

Dr. Chas. Berry gives his experience in the epidemic of diphtheria at New Ulm in 1876-77. The cases were largely of the croupous form of the disease; a dense, fibrous membrane lining the whole of the mucous membrane of the nasal passages, and often that of the larynx and bronchi. He found great benefit from, and thinks many lives were saved by the inhalation of lime vapor. He would have the little patient held over a dish of hot water in which small pieces of quick lime were being slacked. In addition to that, Dr. B. says: "I use with the spray instrument solutions of carbolic acid, carbonate of lime, permanganate of potassa, chlorinated mixtures, &c."

NOTE.—While it is good practice to have, in cases as above described, the steam atomizer at work in the room a part of the time at least, in order that the air of the sick room may be thoroughly disinfected and laden with the medicated vapor, yet for the effectual local application of the medicated spray to the throat, the hand alomizer with a long, curved metallic tube is the indispensible instrument.

OBSERVATIONS.

In reviewing the facts which we have been able to gather in this study of the history of diphtheria in Minnesota, we shall notice only such as seem to bear directly upon the subject of the prevention and cure of the disease.

Concerning the causes of diphtheria and our means of preventing the effectual operation of these causes, we have the following facts:

1st. Diphtheria often originates spontaneously, where contagion is impossible. Sporadic cases, some of which have occurred in almost every locality in the State, have generally originated in this manner, as well as have the first cases in many local epidemics.

Oertel and others attribute the cause of the disease in cases of spontaneous origin to a miasm; but the term "miasm" is unsatisfactory, until we know something of the nature of the agent to which the term is applied, and of the conditions under which it originates and acts. Dr. W. W. Sweney speaks of sporadic cases occurring about Red Wing in localities "dry but malarial in the proper season." In connection with the little epidemic last year at Minneiska, we have the fact mentioned that the bluff side on which the village is situated, projects to the river, with marshes above and below the town. At Minnesota City, the mill pond and the river bottoms are near the village; but Brownsville has never known a case of diphtheria, although its situation is like that of Minneiska in all essential particulars. Moreover, it is a fact that no city or town in the State situated on the Mississippi river has ever suffered severely from diphtheria.

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For the sake of illustration and comparison I have taken the following from a Report of the State Board of Health of Massachusetts, concerning diphtheria in the city of Gloucester, Mass.

"The extremity of the peninsula which extends out in a northeasterly direction, and forms the north shore of Massachusetts Bay, consists of an island from four to eight miles through, the outermost part of which is the town of Rockport, the remainder comprising all of Gloucester except the eighth or westerly ward.

"The climate in the warm months is so salubrious that the place has long been a resort for tourists and boarders; and there are many summer residences scattered here and there. In the autumn, winter and spring, the chill of the easterly and northerly winds is so intense as to have become proverbial. The soil is a loose, sandy, rapidly drying loam, overlying rock or clay. The rock is chiefly granite, and in many places occupies a considerable portion of the surface of the ground. It is very irregular in form, its upper contour extending to varying depths, mostly quite superficial. The clay is from six to twenty feet below the surface of the ground, but is usually not found where the soil is quite shallow.

"Gloucester has been settled a couple of centuries; the growth of its more thickly populated parts has been chiefly during the last thirty years. The population is quite free from the extremes of wealth and abject poverty. The people are largely engaged in fishing, farming and other out-of-door work; fishing is the chief industry. There is quite a large floating population of natives and foreigners, including some Portuguese fishermen, whose families follow their changes of residence to a considerable extent. The children live largely in the open air, and those who survive the diseases of early life are tough and strong. Fresh air from the ocean circulates over the whole island unobstructed; only the westerly winds come from the land. The land rises rather abruptly from the edge of the harbor, then quite gradually, finally falling again, or remaining nearly level, so as to form settling-places for the surface water. Surface drainage is good for about one-third of the four central wards, indifferent for a quarter, and very bad for the remaining portions.

"The natural advantages of Gloucester are abundance of pure air and an absence of excessive summer heat. The disadvantages are exposure to the chilly winds and moist atmosphere of the cold months; a shallow soil overlying an irregular surface of rock or clay, and consequently a moist sub soil with many wet or damp cellars. Since the settlement of the town privies have been in use, with loose-walled vaults, which allow soakage into the ground, and consequently a general contamination of the sub soil and of the wells."

Is there reason for the belief that the general features of this city and location and surroundings have any relation to the prevalence of diphtheria among its inhabitants? It is a fact that in the year 1876, 101 deaths occurred from this disease in a population of about 16,000.

The Massachusetts report concerning diphtheria in Gloucester, says further: "It can be said that diphtheria has been most prevalent and fatal in the lowest, worst-drained and most filthy parts of the city, where the most improvident and poorest classes are obliged to live."

Our observation in Minnesota this year and concerning the disease in the State in former years, confirms what is suggested in the above report concerning some of the causes of sporadic cases of diphtheria and the first cases in the epidemics that have occurred. The especial character of the soil seems to be of less importance than its dampness and temperature. There is great difference in the character of the soil on which the city of Gloucester on the coast of Massachusetts is

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built and that of most of the towns in Minnesota, but the uneven surface of the underlying granite rock may hold water in stagnant pools, although out of sight in the earth and causing soil saturation in places, as well as may the underlying limestone in Minnesota. We have found the disease to be far less prevalent on the porous sand-soil of Winona and Lake City, where pure water could be obtained from deep driven wells, than in the cold, springy soil of shaded valleys. At Mankato last year there were more cases, and these were more malignant, on the somewhat elevated tables on which a great part of the residence portion of the city is built, where the underlying strata of limestone holds the soil, than on the lighter and more sandy soil of the river bank.

But while the local conditions resulting from moisture and a comparatively low temperature under and around our dwellings, have an influence in developing the disease and upon its severity after it has been developed, yet there other important factors in the causation of diphtheria, as far reaching and as wide as the zone in which we live. While it is impossible to escape from the influences of the latter class, it is practically nearly as difficult to avoid many of the evil influences even of a local character. It is difficult for the population of a village to change the location of their residences to a more healthy site; and the most that may be hoped for, is that a general diffusion of definite knowledge on sanitary subjects of this kind may cause existing unhealthy locations to be improved as far as may be possible, and may help the future selections for the location of homes to be more wisely made.

We have seen that an important cause of diphtheria is animal and vegetable filth, contained in the earth, air and water in and around the dwellings where the disease has originated. Our correspondents have given us facts all pointing in one direction on this point. Here is the opportunity for sanitary work, and for the aid of sanitary laws. It would be a long step forward, if the state not only provided for but required each town and city to support an efficient health board, whose duty it should be to cause, twice in each year, a diligent and intelligent house to house sanitary inspection to be made. A writer in the Springfield (Mass.) Republican says: "As to the origin of diphtheria, the weight of testimony is that it belongs to the class of filth diseases, but further than that its source is not clear. Families which would be scandalized at the suggestion of untidiness are attacked, while others of filthy surroundings escape. This simply shows that our sense of cleanliness needs cultivation, so that we may discriminate between what is offensive to the system, and what is offensive to our falsely educated tastes. The farmer's wife, to whom the closed and carefully dusted parlor, or the preternaturally scrubbed floor, are the essentials of neatness, may endure the proximity of a sour swamp or of the kitchen cess-pool for years without taking offence. To many a careful, laborious housekeeper, a chance cob web or the children's "litter" of a few hours' play will out-rank in heinousness a defective drain for the cellar or a badly conducted privy."

2d. Diphtheria is a contagious disease.

The fact most clearly proved by our investigation, and which has been illustrated by a large number and variety of cases, is that of the infectious and contagious character of this disease. See the reports of Drs. Hand of St. Paul, Pratt of Stillwater, Collins of St, Peter, Cross of Rochester, Coon of Northfield, Hunt of Waseca, and others.

Concerning the nature of the contagious principle, some important points have been gained by our observations. There has been a general opinion expressed and evidence furnished, that the virulence of the contagion has a relation to the

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severity of the case or cases from which it comes. The lack of ventilation of the sick room increases its intensity. It has been made evident that it accumulates in clothing, especially in unclean bedding, and in the walls and furniture of rooms not properly cared for during the time of their occupany by the diphtheritic patient. One who has read the testimony contained in this report will, I think, be prepared to accept as true the following words of Oertel: "The diphtheritic contagion shows itself in the tenacity with which it clings to certain places, rooms and houses, and in the fact that it can occasion sporodic cases in those places after the lapse of months." In many parts of our State old log houses seem to have been the magazines of deposit for diptheritic contagion and served as much of a purpose in preserving the poisonous principle, as did shallow surface wells and filthy house yards the purpose of its propagation.

The means of prevention suggested by this part of our study is, most emphatically, a rigid quarantine whenever diphtheria makes its appearance in a community.

Recently a family residing in Rochester in this State, had a boy attending school in Owatonna, in which place diphtheria was prevailing in an epidemic form. The boy was taken with the disease, and died. During his sickness his parents were with him in Owatonna. After the death of the boy, the parents returned home to Rochester, having, as they supposed, taken precautions against carrying the contagion of the disease with them. Each of the parents had some symptoms of diphtheria (sore throats) after returning home. Two of their children now came down with the disease. There was no diphtheria in or about Rochester at the time. One of these children died and the other recovered. Here was an opportunity for the beginning of an epidemic of diphtheria in Rochester. On the other hand, here was a chance, possibly to prevent the further spread of the malady by a rigid quarantine of the family affected. This course was adopted. Children, and even adults in families having children, were kept away, and there was no public funeral. Ignorant persons would have had it otherwise, and, impelled by ignorant wilfullness, at the risk of the lives of their children, would have flocked into the poisoned home for the useless purpose of attending the funeral; but such was not allowed, and, be it said to the credit of all having the matter in charge, so carefully was the isolation of this infected family from the citizens of Rochester kept, that the plague stopped here, and not a single case resulted from this contagion. We give the case as an example for imitation.

Concerning the character of the contagious principle.

It is not our purpose, nor is it in keeping with the purposes of this report, to enter into speculative theories concerning the pathology of diphtheria. We have, however, as a part of our investigation, secured the microscopic examinations of specimens of diphtheritic exudation. The results of these examinations appear in the reports of Dr. C. H. Boardman, of St. Paul, and of Prof. I. N. Danforth, of Chicago, published herewith.

Finally, as bearing upon the matter of medical treatment of diphtheria, it is found that the various chlorine preparations, the mur. tinct. of iron, the dilute sulphuric acid, sulpho-carbolate of soda, and other antiseptic remedies have the effect apparently of destroying, to a certain extent, the *contagium vivum* of the disease; also that quinine is a good remedy; that a saturated solution of chlorate of potassa, to which is added a small quantity of dilute hydrochloric acid, this to be given freely and frequently, is good treatment. Locally, the careful application with a brush of hydrate of chloral and glycerine, or the solution of carbolic acid in glycerine and water, with a flavor of tincture of iron, thrown into the

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throat by means of the hand spray apparatus; and, in the croupous form of the disease, the use of lime inhalations, are among the best means in our knowledge. But in dealing with malignant diphtheria, we meet with cases in which the poison of the disease will destroy life by overcoming the vitality of the nerve centres, rendering the blood unfit to maintain vital action, before our antiseptic remedies can have time to neutralize the poison or counteract its effects. In all true cases of the disease there is danger of this result. It is now the opinion of the great majority of intelligent observers that alcohol, given in such a form as may be found to be most acceptable to the stomach, is an invaluable remedy, and, timely given, has been and undoubtedly will continue to be the means of saving many lives. While the medical profession may be slow to adopt the extreme view of Prof. Chapman of Brooklyn, as to the specific virtues of this remedy in diphtheria, yet those who have tried it, will, I think, entertain but one opinion concerning the value of this drug, in cases where the severity of the disease demands the efficient action of a prompt remedy.

In concluding this report, we append the following extracts from a circular issued by the Massachusetts State Board of Health in Oct., 1877, and commend its suggetions and directions to the authorities and people of our own State.

"As diphtheria is a contagious disease, and under certain circumstances not entirely known, very highly so, it is important that all practical means should be taken to separate the sick from the well. As it is also infectious, woollen clothes, carpets, curtains, hangings, &c., should be avoided in the sick room, and only such materials used as can be readily washed.

"All clothes, when removed from the patient, should be at once placed in hot water. Pocket handkerchiefs should be laid aside, and in their stead soft pieces of linen or cotton cloth should be used, and at once buried.

"Disinfectants should always be placed in the vessel containing the expectorations and may be used somewhat freely in the sick room; those being especially useful which destroy bad odors without causing others (nitrate of lead, chloride of zinc, &c.)

"In schools there should be especial supervision, as the disease is often so mild in its early stages as not to attract common attention; and no child should be allowed to attend school from an infected house until allowed to do so by a competent physician.

"In the case of young children all reasonable care should be taken to prevent undue exposure to the cold.

"Pure water for drinking should be used, avoiding contaminated sources of supply; ventilation should be insisted on, and local drainage must be carefully attended to. In country towns, privies and cesspools should be frequently emptied and disinfected; slop water should not be allowed to soak into the surface of the ground near dwelling houses, and the cellars should be kept dry and sweet.

"In all cases of diphtheria fully as great care should be taken in disinfecting the sick room after use, as in scarlet fever.

"After a death from diphtheria, the clothing used should be burned or exposed to nearly or quite a heat of boiling water; the body should be placed as early as practicable in the coffin with disinfectants, and the coffin should be tightly closed.

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"Children at least, and better adults also in most cases, should not attend the funeral from a house in which a death from diphtheria has occurred.

"Although it is not at present possible to remove at once all sources of epidemic disease, yet the frequent visitation of such disease, and especially its continued prevalence, may be taken as sufficient evidence of insanitary surroundings, and of sources of sickness to a certain extent preventable.

"It should be distinctly understood that no amount of artificial disinfection can ever take the place of pure air, good water, and proper drainage, which cannot be gained without prompt and efficient removal of all filth, whether from slaughter houses, etc., public buildings, crowded tenements or private residences. In the opinion of the Board, this is likely to be done properly only through independent local boards of health, the appointment of which, in all cases, we most respectfully, but earnestly, urge upon the citizens of the State."

APPENDIX A.

DIPHTHERIA IN MANKATO AND VICINITY

(The epidemic of 1878.)

BY E. J. DAVIS, M. D.

Within the past five months (December, 1878,) Mankato and several adjacent townships in Blue Earth county have been visited by an epidemic of diphtheria.

I.

Concerning the Origin and Cause of the Disease.

1st. From what I can learn in regard to the origin of the epidemic, I conclude that the first case or cases in our city appeared spontaneously. In the first cases that came under my observation the hygienic surroundings were bad; the soil was low, springy and wet, and in two or three houses water had almost invariably been found in the cellars after a rain, during the past spring and summer. At the time of my visits the odor emanating from the cellars was exceedingly offensive.

2d. I have not seen any cases imported by contagion, yet have heard of several that caught the disease by its being imported.

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3d. When contracted by contagion, and the person contracting it was a child, it has almost invariably assumed the same character and severity as in those from whom it was taken; but if contracted by an adult, it has generally been of a milder type.

II.

As a Sporadic Disease.

The number of sporadic cases of diphtheria that have come under my observation, during a residence of ten years in this city, have been comparatively few, and they generally of a milder type than in the present epidemic.

III.

As an Epidemic Disease.

1st. The present is the only epidemic of diphtheria we have had since I have resided in this city. It began about the 10th of July, and has continued with more or less severity until the present time.

2d. We have had quite a large number of cases that were of a malignant type, the pseudo membrane in this class presenting a pearly or oyster-like appearance, and extending rapidly forward, until it covers the whole of the soft palate. In this class we find in about twenty-four hours after the first febrile manifestation, the diphtheritic membrane covering completely one and sometimes both tonsils, with the mucous membrane of the soft palate on one side highly inflamed. This soon presents a puffy, pearly appearance, and in a short time the diphtheritic exudation shoots up in streaks, burrowing itself, as it were, into this pearly, puffy membrane, then spreading rapidly and covering the whole of the soft palate, and rolling itself out in all directions, it becomes quite large, and assumes an oyster-like appearance. The opposite soft palate is generally about twenty-four hours behind its fellow in passing through the above stages. We have also observed the soft palate to be of a dusky red appearance, elevated in patches like blisters. These soon coalesce and present the appearance above described. In all the cases that I have seen of this type, the neck externally has been enormously swollen, the swelling extending down to and often over the sternum, and towards the end, the skin presenting a purple or mottled appearance. The mucous membrane of the nose is also affected, and there is a constant discharge from it, which, at first, is a glairy fluid, sometimes bloody, and finally, the odor emitted from the breath is like that from a gangrenous and very offensive slough. The gastric disturbance in this type is very marked, and generally the patients have a loathing, a perfect dread, even of the blandest kind of food or medicine, and ask for nothing but water. In some of the cases observed, vomiting continued persistently from the onset of the attack until death relieved them of their suffering. We have not been able to make any post mortem examinations, hence cannot say that the membrane extended into the stomach, yet in these cases the power of digestion was in some partially, and in others completely destroyed. Whatever may have been the treatment in cases assuming this type, they have been uniformly rapid in progress, and terminated fatally in from three to five days.

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IV.

As an Infectious Disease.

1st. I had charge of a family of five children; three were taken sick at the same time with diphtheria; sent the fourth immediately to grand parents near by, and the fifth child was out of the city. One of those attacked was a mild case, and the other two severe ones, and one of the latter died of diphtheritic croup. After recovery of the remaining two, I ordered the house to be thoroughly disinfected, whitewashed, the bedding and bed clothes washed, &c. In about a week after this was done the other two children were brought home; one was attacked in six and the other in seven days, the disease assuming the same type as in the two other severer cases. I afterward learned that the last two children occupied the same bed used by those first sick, without the bedding and some of the bed clothes being previously washed, and for this lack of cleanliness I attribute their taking the disease.

2d. I am inclined to the belief that the purulent discharge from the nose, which in some cases is very abundant and exceedingly offensive, may, if it attaches itself to the clothing, communicate the disease to others.

V.

As influenced by external condition.

1st. There have been two or three new outbreaks of the disease when the wind happened to change to the south and continued to blow strong for several days from that quarter; and some maintain that whenever it comes from that direction we may look for a fresh outbreak. I do not think that the season of the year has any influence whatever on the disease.

2d. It is more apt to be propagated in low, damp places with bad hygienic surroundings; yet some of the severest cases we have had, have occurred in houses where the soil about them was unusually dry.

3d. Cleanliness is an essential requisite in the prevention of this disease, yet it has occurred in a malignant form in families where habits of neatness have been rigidly observed.

4th. I do not think that we have been having any more typhoid fever than during the same season in other years; nor erysipelas, roseola, or measles.

VI.

As affected by constitutional conditions.

1st. In the present epidemic there has been no exemption on account of nationality or race from the ravages of this disease. It attacks alike the suckling child and those whose locks are silvered with years; but in this epidemic it has confined itself mostly to those between the ages of three and five years, and to about the same number of each sex.

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2d. Persons that are previously affected with catarrhal disease are more liable to be attacked, and it has a tendency to assume a severer type in such cases.

3d. From our observation of its workings, we are firmly of the opinion that it is a constitutional disease, hence, when it attacks persons of a strumous diathesis, their chances of recovery are materially less than in other cases.

VII.

Concerning the course and pathology.

1st. Its onset is sudden and insidious, and the characteristic and rapidly extending pseudo membrane has often been found when the first symptoms of illness attracted the attention of parents or physician. The initiatory fever has been unusually high in nearly all classes of cases, and has continued, with but slight abatement in the malignant ones, to the end. This, coupled with the local manifestation in the throat, has enabled us to determine early whether the case would be a mild or severe one.

2d. After a thorough and careful clinical study of diphtheria, I am confident that it is a constitutional disease, and that the membranous deposit in the throat is simply a local manifestation of a general disease.

4th. I have made analysis of the urine of nearly all cases that came under my observation, and found albuminuria existing in all, but in much larger quantity in the severe ones; also in them the amount of urine secreted was often very small, and sometimes towards the end, none at all.

5th. About ten per cent. of my cases have been hemorrhagic, and generally those of the severest type.

6th. In its pathology it is closely allied to scarlatina; and if a case of scarlatina maligna be deprived of its efflorescence, it would require a delicate diagnosis to distinguish it from some of the modifications of diphtheria.

7th. The two maladies, membranous croup and diphtheria, are similar, in so far that in each laryngitis precedes the formation of the pseudo-membrane; but other than this I do not think there is any relation between them: because the local manifestation in diphtheritic croup is secondary, and dependent upon or the result of a constitutional disease; whereas membranous croup is simply the manifestation of a local trouble.

8th. As is usually the case during the prevalence of an epidemic disease, there prevailed, in this instance, both among the young and adults, especially adults who had sensitive throats, a peculiar liability to a diffusive inflammation of the throat. This condition of pharyngitis has been constantly under the observation of every physician, and required very little, if any, treatment, But the disease denominated diphtheria, has not been easily confounded with this concomitant affection of the throat, except by the careless observer. I limit the term diphtheria to those cases in which the inflammation in the throat is attended with patches, or pseudo-membranous formation; and believe that unless this condition exists, they cannot be called true diphtheria.

VIII.

The Results and Sequelæ.

1st. I estimate the present population of our city to be about six thousand. The total number of deaths from diphtheria in the city from July 10th to Dec. 1st I find to be forty-eight (48). The youngest was a year old, the oldest fifteen;

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the largest number at seven, and two-thirds between the ages of five and ten years. Five of our leading practitioners report having two hundred and thirty (230) cases, and for the balance of our physicians I report approximately a hundred to a hundred and twenty-five more, making a total of about three hundred and fifty cases. Thus it will be seen that 13.7 per cent. of our cases terminated fatally.

2d. In the type of cases mentioned, death has resulted from the combined effects of asphyxia and blood poisoning. A large per cent. of fatal cases have been from croupous diphtheria, and but few from blood poisoning after they had passed through the acute stage of the disease.

4th. It is too early, in the present epidemic, to give a satisfactory account of the sequelæ of the disease, and yet I have seen several cases in which there was partial paralysis of the muscles of deglutition and speech; also many followed by great loss of vitality, with anæmia and general weakness that required weeks for them to recover from.

IX.

Remedial and Preventive Measures.

1st. Separating the well children, immediately, from those attacked, and keeping them apart, also admitting no persons into the sick room except the attendant. Cleanliness about the premises and in the sick room, burning the clothes or handkerchiefs that are used to collect discharges from the mouth or nose, not allowing dishes used by the sick to be used by other members of the family, are important precautionary measures. Use disinfectants freely, such as chloride of lime, carbolic acid, bromo-chloralum, &c., and make a thorough cleaning and fumigating of apartments after death or recovery of patients. I have prescribed quite freely, the sulpho-carbolate of soda, and, from my observation of its workings, believe it to be a remedy of undoubted merit as a prophylactic against this disease.

2d. Cleanliness of apartments and an abundance of fresh air are absolutely essential. Chlorine, sulpho-carbolate of soda, chlorate of potassa, with dilute alcohol as a gargle, bits of ice in the mouth, especially during the febrile stage, being very grateful to patients; also, during this stage, the internal use of aconite and belladonna combined; milk, broths, and last, but by no means least, stimulants given freely immediately after the febrile stage. I am of the opinion that if the system is placed well under the influence of the sulpho-carbolate of soda, the severity of the attack will be greatly modified. This is supposed to be a new remedy, and yet, as far back as 1870, we find that Dr. Sansom of London, administered it in cases of diphtheria and remarks: "My experience of the use of sulpho-carbolate of soda in zymotic disease, is unexceptionally favorable." Active and severe local treatment to the throat does more harm than good. For external use I have used camphorated oil.

The amount of rainfall during the months of May and June, especially the latter part of June, was unusual for that time of the year and in this locality. As a result of this the soil became thoroughly saturated, wells filled largely with surface water, water was in many of our cellars, and there was a very general complaint of carpets and like furniture becoming mildewed. This, together with the fact that

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in the first cases of diphtheria that came under my observation, the soil about the premises was low and damp, and the wells filled largely with surface water, induced me to think that possibly the character of the water might be the cause of our epidemic. Acting on this supposition, I collected and forwarded to Prof. S. F. Peckham, of our State University, eight samples of well water taken from different sections of our city. Five of them were taken from wells where there had been, in numbers of families using water from them, malignant cases of diphtheria, and in the other three no cases had occurred in numbers of families using water from them. Prof. Peckham's report of his analysis of these samples of water may not reflect very highly upon our present water supply, and yet I am confident that it will compare favorably with other towns in our State that have been in existence as long as Mankato, having as large a population, and obtaining their water supply in a similar way.

MANKATO, Dec. 9, 1878.

APPENDIX "B."

DIPHTHERIA IN ST. PETER AND VICINITY.

BY A. W. DANIELS, M. D.

In reply to the circular of the State Board of Health on diphtheria, I have the honor to submit the following concerning the prevalence of diphtheria in this village and surrounding country:

"St. Peter has a population of about three thousand, made up of Scandinavians, Germans and Americans. The location is on the west bank of the Minnesota river, twenty to one hundred feet above high water mark, and the natural drainage of the site is good. The soil is a sandy loam, with sub-soil of sand and clay. The water supply is from wells, is of a limestone character, and found by digging from twenty to thirty feet. The wells are generally in a good condition, and the water supply abundant. The sanitary condition, drainage and cleanliness is good, and the town is thought to be one of the most healthy in the State.

The first epidemic of diphtheria appeared in our village during the fall of 1862, soon after the "Indian outbreak." At that time the town was crowded with refugees from the surrounding country, and every house was filled to its utmost capacity. The sudden influx of so large a number of destitute, half-clad and suffering people, soon produced a deplorable sanitary condition. Typhoid fever

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was first to make its appearance, soon followed by measles and diphtheria, the two latter becoming epidemic. I have no notes to enable me to supply an accurate number of cases and percentage of mortality; therefore must rely upon memory. Probably there were not less than seventy cases of diphtheria, of which some twenty were fatal. The deaths were mostly of children under ten years of age. Throughout the epidemic, the disease manifested a decided tendency to attack such as were suffering from measles, and a large proportion of the deaths was the result of this complication.

Since the epidemic of 1862 more or less sporadic cases of diphtheria have appeared every fall, winter or spring, coming with the catarrahs and throat troubles that prevail during these seasons. I can call to mind but two cases that appeared during the summer months.

The present epidemic of diphtheria commenced early in September, and has not yet fully disappeared. It was noticed that the disease did not effect a lodgment in a particular part of the town and spread from that infected district, but appeared in different localities about the same time, and the first victims of the disease were children, whose tender years had necessarily confined them to their homes.

The number of cases, as near as can be ascertained from careful inquiry among the physicians, has somewhat exceeded one hundred. Of these, fourteen fatal cases are reported. But few adults have been attacked, and none have died. Children have been the principal sufferers, and the fatal cases generally under eight years of age.

The catarrhal has been the prevailing variety. But this form of the disease has manifested a marked tendency to extend itself to the air passages, and to assume the croupal variety. From this complication has come the great mortality of the disease. Every death during the present epidemic has been the result of croupous diphtheria—nineteen cases having occurred, with only five recoveries.

A large proportion of the fatal cases received little or no treatment. Parents supposing their children were "only suffering from a cold," neglected calling a physician until it was too late to prevent a fatal result.

Personal cleanliness and *apparently* favorable hygienic surroundings have not seemed to influence the spread or severity of the disease. A great majority of cases have occurred in the most cleanly families and in the healthiest localities, while less favored families and situations have entirely escaped.

The disease has been decidedly more severe and fatal among those of a strumous diathesis, and in such cases has manifested a tendency to attack whole families.

It has been noticed that the amount of exudation upon the tonsils did not always indicate the gravity of the disease. In four cases the tonsils showed but a slight trace of exudation, and there was apparently no reason for serious apprehensions; yet within a few hours all the alarming croupal symptoms followed.

In a single case the croupal symptoms manifested themselves three days before the exudation took place on the tonsils. In one case uræmic convulsions occurred.

The remedies I have found of the most service, I will merely enumerate:

Locally, { Inhalation of steam from lime water.
Brushing tonsils with sal. ferri persulph.
Gargle of sal. C. potash or chlorine water.

Constitutionally, { Alcoholic stimulants.
Quinine.

Antisiptic—Sol. carbolic acid.

ST. PETER, Dec. 17, 1878.

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We are still having a few cases of diphtheria here and in the vicinity.

I have little doubt of the infectious character of the disease. Two cases have occurred in this vicinity where it *seemed* to have been conveyed by infected clothing a distance of many miles. The first was the case of Mr. S., who visited a family twelve miles from his home, where there was diphtheria. In one room five were sick and the air was very offensive. Five days after his return home, his daughter fell sick, and on the following day, a young man in his employ. These were the first and only cases in the neighborhood.

The second case was very similar. A mother visited a daughter twenty miles away, whose child was sick of diphtheria and died during her stay. She returned home, and on the sixth day after, one of her children came down with the disease, and in a few days after, two others. These were the first and only cases in the vicinity. Many other cases pointing toward the infectious nature of the disease have occurred, and the evidence is strong that it is often spread in this way.

The identity of diphtheria and membranous croup is a question still unsettled in my mind, though it has seemed to me they are the same, only affecting primarily different localities. Several cases have occurred during the present epidemic, where the croupal symptoms manifestad themselves several hours before any exudation took place on the tonsils. And the large number of cases of membranous croup that have occurred during this time, make it evident that the two diseases are very similar or identical. In two or more families, the two forms of the disease were present at the same time, one child appearing with extensive exudation upon the tonsils, and another with croupal symptoms and no exudation.

ST. PETER, Nov. 30, 1878.

APPENDIX "C."

DIPHTHERIA IN ST. PAUL AND RAMSEY COUNTY.

BY C. H. BOARDMAN, M. D.

I shall endeavor in this paper, as well as limited time and paucity of material will permit, to present a brief review of the various visitations of diphtheria in Ramsey county.

Without attempting to treat in detail each of the topics suggested by the circular of the State Board of Health, I will endeavor to describe all features of interest or importance that have been presented in connection with the disease in question in this locality.

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And first, happily for Saint Paul, however much it may detract from the value of this report, the subject of epidemics of diphtheria may be very summarily treated. It has never prevailed here to such an extent as to warrant its being regarded as an epidemic. The greatest number of cases in any one year occurred in 1874–5,* and at present there are several reported. These are not of a severe type, and are expected to recover.

To what this immunity has been due it is impossible to say. The hygienic condition of the city is not more favorable than that of neighboring towns which have suffered severely; and there are no known causes, telluric or atmospheric, to which can be attributed the failure of the disease to appear as an epidemic. Indeed, in some localities within the city limits it is more than probable that all the conditions which, in the opinion of some, are sufficient for the development of diphtheria may readily be found; yet thus far without producing it. Says a writer in the British Medical Journal, June, 1858, "There appears to be no difference in the geological nature of the country, the level, or the aspect, in increasing the severity or granting an immunity from the disease." With regard to the influence exerted by the moisture of the air, by the temperature, and by the particular locality, Trousseau thus expresses himself: "In the villages of the Loire, remarkable for their salubrity and their excellent position, I have seen diphtheria prevail to a terrible extent, while the villages of Sologne, situated in the midst of marshes, remained exempt; and again, hamlets bordering upon ponds depopulated by the epidemic, while others enjoyed a complete immunity."

It seems to be the concurrent opinion of most observers that the disease is dependent on unknown climatic or meteorologic laws; and while, doubtless, there are laws which it obeys, their nature and operation are as yet unknown. If it be true that diphtheria is sometimes due to exposure to sewer gas, we must admit either that there are contained in this gas two or more distinct poisons, since to it typhoid fever is directly traceable, and sometimes an adynamic condition which is neither typhoid nor diphtheria, or that the nature of the affection resulting from such exposure is determined by some pre-existing condition of the system; so that what shall produce a certain disease in one case, shall in another engender something entirely different.

It is to be regretted that careful notes of cases occurring here were not made, and yet more, that there is no record either of autopsies or of microscopic observations. It follows, that no direct answer can be made to several of the queries contained in the circular.

Whether any special effort was made to determine causation, or the development of the disease by contagion, does not appear. The surroundings of patients as to hygiene, social status, and, so far as the disease may be due to local causes, exposure, have varied in almost every degree. The disease has made its appearance with perfect impartiality in the shanty and in the comfortable home; nor can I learn that any cause was found in constant operation to which the disease could fairly be attributed.

The great majority of cases appear to have been sporadic; while, of course, it can not be said positively as to these, that there was no possibility of contagion, yet careful inquiry has failed to elicit anything that points to that source.

In a few instances, the disease arising apparently *de novo*, was the starting point of contagion; being communicated from one member of the family to others, so that three or four would suffer from the malady in succession. Com-

*See table of Statistics.

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plete isolation does not seem to have been enforced. Although enjoined as a precaution, either from ignorance or neglect it was overlooked, or so imperfectly practised that no benefit was derived from it.

Where the disease was thus directly traceable to contact, it in some instances resembled in type the case from which it sprung; in others, it departed more or less widely. Here and there one fatal case rapidly followed another; again, a mild form of the disease was succeeded by a virulent attack, and *vice versa*. Without doubt, the liability to contagion varies greatly at different times and under different circumstances; hence the marked discrepancy in the opinions of observers. While the influence of contagion is established, the exact mode of its operation is unknown; constitutional predisposition, however, undoubtedly contributes largely to the probability of an attack. "Zymotic in its nature, it tends to fasten upon whomsoever is debilitated by previous disease, or by a constitution naturally feeble and artificially effeminated, or whose vitality is lowered by the depressing influences of luxury, indolence and inactivity, and the habitual defiance of physical and hygienic laws which is so frequent an element in fashionable life. Hence individual causes come into play, and introduce this associate of the poor into the palaces and mansions of the great, which they so often fringe. Diphtheria finds there its victims pale and anæmic, or grossly sanguineous and unhealthily excited."* The length of time that may elapse after exposure and before the onset of the disease, tends to mislead in the prosecution of this inquiry; an interval of three or even four weeks sometimes occurring before the appearance of symptoms due to contagion.

The character of the cases in this county has varied widely; in a few instances malignant and rapidly fatal, in others, ending in recovery, protracted and tedious. The disorder has in a third class been of so mild a grade as to give rise to doubts of its genuineness. The symptoms which characterized these various classes need not be detailed; they can be found in all the text-books, and are familiar to every physician. The majority of cases have belonged to the second of the varieties mentioned.

In some instances the severity of an attack has seemed due, in a measure, at least, to the disregard of hygienic conditions. It is possible, however, if not probable, that these conditions influence the frequency and even the fatality of diphtheria less directly than the permanency and diffusion of the infectious principle.

Diphtheria has prevailed here chiefly, indeed, almost exclusively, in the spring and fall; and usually in damp or wet weather. It has appeared indifferently on sandy soil, loam, or where the limestone lay immediately beneath the surface. Nothing warrants a belief in the agency of miasm as a factor in its production.

Reference has already been made to the social relations and physical surroundings of families invaded by the disease. As a general rule it has been associated with ill-ventilated, contracted hovels, and with close, dark rooms, but by no means exclusively. Nor has its co-existence with other zymotic diseases been observed; it has seemed wholly independent of these, whether as a sequel or otherwise.

It cannot be said that any nationality was peculiarly liable to the malady, nor that one sex was more frequently attacked than the other; but nearly all cases occurred in children, or in young persons under the age of 17 years.†

No influence could be attributed to pre-existing catarrhal disease, nor to the strumous habit.

*Hart on Diphtheria.

†See Statistics, page 78.

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In a majority of cases the invasion of diphtheria has been general. Lassitude, *malaise*, anorexia, headache, and sometimes febrile movement, the usual predromata, have usually ushered in an attack. After lasting for a period of from two or three days to a week, an increase in severity of these symptoms, to which by this time were added complaints of sore-throat, *i. e.* dysphagia, and sometimes vomiting or diarrhœa, has induced resort to a physician. At this point, in every instance, so far as can be ascertained, the exudation upon the tonsils or pharynx, or both, had already occurred; in no case has the patient been seen before the formation of the membrane. The initiatory fever has not, as a rule, borne any relation to the severity of the subsequent symptoms; but when fully established, the former usually advanced, *pari passu*, with the latter. In the few cases to which the term *fou droyante* has been applied by the French, more violent symptomatic disturbance at the outset has occurred. Introduced by the symptoms already mentioned in the aggravated form, and by coryza and swelling of the cervical lymphatics, these cases ran a rapid course, exhibiting extreme adynamia and proving fatal by septic influence than rather than by asphyxia.

With reference to the points embraced by questions 2 and 3, section 7, (autopsies and microscopic studies) unfortunately, no observations have been made.

In the rapidly fatal cases, albumen has not been sought for, but in others, whether mild or severe, it was found about as often as in scarlatina. The urine was frequently not tested unless there was some reason to suspect nephritic complication.

Hemorrhages have been very rare; only an occasional epistaxis having been noted.

No relation has been observed between scarlatina and diphtheria. The former disease is of common occurrence here; the latter comparatively rare. Nor, in the opinion of those most competent to judge, is there any affinity between croup and diphtheria; the members of the profession here regarding one as purely local, the other as a general, truly zymotic disorder. The principal points of difference between the two diseases as noticed here, are as follows:

In diphtheria, the symptoms due to laryngeal obstruction were neither so paroxysmal in their commencemant, nor so dependent upon the urgency of the cough. The suffocative dyspnœa has been more gradual in its approach, and has not usually occurred so early as in croup; but after its appearance, there has not been so complete a remission as after the first paroxysm of that disease. The impeded respiration, with signs of laryngeal and tracheal obstruction, has been detected in many cases before any severe distress had been occasioned thereby.

In croup, the approach of the disease has been heralded chiefly by hoarseness and a harsh cough increased toward night; while dulness or debility, anorexia, nocturnal restlessness unattended by cough, headache, vomiting or diarrhœa, coryza, glistening conjunctivæ, a glairy flow from the nostrils, or their complete stoppage, difficult or painful deglutition, and the enlargement of the cervical lymphatics,—some or all of these, have been the ordinary forerunners of an attack of diphtheria.

It would seem at times as though a certain epidemic constitution determined the co-existence of diphtheria and the so-called diphtheritic sore throat. That the latter sometimes, and not infrequently, prevails epidemically alone, is undoubtedly true; but whether it be due to the same cause which produces the graver disorder existing only to a slight degree, or whether their simultaneous appearance is simply a coincidence, is a question which cannot now, perhaps, be definitely answered; to this end a comparative study of the phenomena of the two disorders is essential.

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The term spurious diphtheria, is vague in the highest degree. It may be made to include every serious case of angina; embracing scarlatina, croup, diphtheritic sore throat, and even, perhaps, some catarrhal affections. Reference has already been made to the differential diagnosis between diphtheria and croup. In scarlatina the febrile disturbance is always directly proportioned to the severity of the attack; the heat of skin is greater and the pulse attains a higher degree of frequency than in diphtheria, while the diminished fulness and frequency of the respiration which characterze the onset of the latter disease, are wanting. The redness of the throat in scarlatina is uniformly diffused; in diphtheria it occupies those portions of the mucous membrane which are about to become the seat of the exudation. There is no tendency of the faucial inflammation in scarlatina to extend into the air passages, but greater likelihood of sloughing of the tonsils and suppuration of the cervical glands than in diphtheria, and the nasal tone and regurgitation of the fluids through the nostrils, which in scarlatina diminish with convalescence, are in diphtheria maintained or increased by subsequent paralysis. Serous infiltrations are common in one; in the other rare. Albumen occurs earlier in diphtheria than in scarlatina, is rarely attended with hæmaturia, and does not result in dropsy. Finally paralysis is in one disorder the rule, in the other an exception.*

As regards diphtheria and the sore throat which is sometimes confounded with it, it may be said that the latter is found in varying degrees of severity. A certain amount of fever may or may not exist, with languor and hebetude; the headache is usually not severe, nor as a rule do we find nausea or diarrhœa; and when these exist they are to be regarded as accidents rather than essentials. The symptoms all centre in the throat, which is congested and reddened, and which frequently presents superficial ulcerations, sometimes on one side, sometimes on both. These are soon covered with a yellowish or grayish white exudation, not differing in appearance from that of diphtheria, which shows no disposition to extend into the air passages. The distinction between the diseases rests upon the trifling constitutional disturbance of the simpler affection, and the readiness with which it yields to topical applications.

The proportion of deaths from diphtheria as compared with those from most of the other acute diseases, is large. I here present a table showing, for purposes of comparison, the number of deaths from the more common acute disorders in this county from 1867 to 1878:

Cause of Death.	1867	1868	1869	1870	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	Total
Meningitis	5	1	5	....	6	4	12	13	10	13	9	3	81
C. S. Meningitis	....	....	16	2	1	18	9	4	....	4	4	3	56
Pneumonia	13	18	24	19	13	33	36	36	28	22	25	22	289
Typhoid Fever	4	10	17	33	39	48	62	26	19	11	18	8	295
Cholera Infan.	13	6	12	19	29	84	59	55	52	49	22	27	427
Croup	....	....	....	2	2	9	12	5	12	7	6	1	56
Scarlatina	...	2	8	6	16	19	7	4	3	6	2	8	81
Diphtheria	....	....	....	....	.....	.....	.....	5½ ys	4 y's.	2 y's.	2 y's.	2 y's.	33
	8 ms	....	....	....	5 y's.	.....	.....	5 ys	3 y's.	1 y'r.	2 y's.	1 y'r.	
	....	....	....	....	4 y's.	....	.....	8 ys	1 y'r.	3 y's.	.....	1 y'r.	
	....	....	....	....	.....	.....	.....	6 ys	5 y's.	6 y's.	.....	.....	
	....	....	....	....	.....	43 y's.	.....	5 ys	2 y's.	4 y's.	.....	.....	
	....	....	....	....	.....	1 y'r.	.....	1½ ys	7 y's.	.... ..	.....	.....	
	....	....	....	....	.....	11 mo	.....	7 ys	4 y's.	.....	.....	.....	
	....	....	....	....	.....	.....	.....	7 ys	8 y's.	.... ..	.....	.....	
	....	....	....	....	.....	.....	.....	.....	1 y'r.	.....	.....	.....	

*Squire: Reynold's System.

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In this table, the ages of those to whom diphtheria proved fatal are given. In the years 1874 and 1875, the disease arrived more nearly at the dignity of an epidemic, than at any other time; there having resulted from it, eight deaths in the former year and nine in the latter. If the mortality from diphtheria be as estimated by some of the physicians of St. Paul, one in four, we shall have for the twelve years from 1867 to 1878, a total of 132 cases; an annual average of eleven. If, according to another estimate, the mortality be assumed to have been one in five, the deaths reported represent an aggregate of 165; an average of 13.7 yearly.

The experience of the members of the profession in Ramsey county is that death has been due with equal or nearly equal frequency to asphyxia and blood-poisoning. It has occurred in a very few instances independently of either of these conditions, after convalescence was apparently established. The distinguishing feature of the fatal result in these cases was a sudden tendency to collapse; death supervening upon what seemed a fit of fainting. It can not be ascertained that the cases terminating in this way presented any peculiar feature during the attack.

Paralysis, almost invariably of the fauces, was of common occurrence. In a very small number of cases the paralysis was general, but in neither variety was the condition permanent.

No lymphatic growths appear to have been noticed. Reference has already been made to renal complications.

Concerning the spread of diphtheria, little if any thing more can be said than to urge the enforcement of the most enlightened hygienic measures within the municipal and domestic spheres. Whether or not the disease be due to a specific poison generated by neglect of this precaution, failure to observe it will at all events, tends to produce and maintain a condition in which susceptibility to the malady will be greatly increased. Due regard should therefore be had to cleanliness, ventilation and drainage, that we may acquit ourselves as far as possible from responsibility in case of an outbreak.

After the occurrence of the disease, the same observance of the laws of health should be maintained, if possible, with even greater diligence. Those suffering from the disease should be rigidly isolated, the expectoration, excreta, and discharges of every kind, should be disinfected and buried, and the apartment stripped of hangings, carpet, and superfluities of every kind.

It would be idle to attempt to present even a resume of the various methods of treatment which have been suggested. That which has met with most favor in this locality, and for which at least as much success can be claimed as for any other, is the administration of the muriated tincture of iron and chlorate of potash, with or without muriatic acid, and quinia. The use of stimulants, though sometimes resorted to, has not been the rule during the height of the attack. Subsequently, when the depression was marked, they have done good service. Nutritious and substantial diet from the beginning has held a prominent place in the treatment. Little or no value has been attached to local medication. It has been used more, perhaps, as a placebo, than with any expectation of real benefit. Ice, however, held in the mouth and swallowed, has been not only grateful and palliative, but has often seemed to exert an influence for good. Hot fomentations have sometimes been used externally.

The sequelæ of diphtheria have been treated on general principles, precisely as in the occurrence of the same morbid conditions existing idiopathically or as resultants of other maladies.

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In concluding, I desire to express my sense of obligations to Drs. Hand, C. E. Smith, Hagan, and Mattocks, for assistance rendered and courtesies extended, during the preparation of this report.

ST. PAUL, Nov., 1878.

APPENDIX "D."

DIPHTHERIA IN RED WING AND GOODHUE COUNTY.

BY W. W. SWENEY, M. D.

The first outbreak of diphtheria in an epidemic form in this section of the State was in August, 1858, on a stream known as Wells Creek; a stream which empties into Lake Pepin below Frontenac. The valley of this creek is a deep indentation in the surrounding country. It is about twelve miles long and one-half mile wide. The creek is a cold stream fed by springs at short intervals along its course. Much of the land in the valley has been made boggy by infiltration from these supply springs. About the same time that diphtheria appeared, in this valley (Aug., 1858) it appeared to some extent in other parts of the county. The course of the extension of this epidemic was in a southwest direction up the valley of Wells Creek, over a high prairie but little settled, and down the Little Cannon River, entirely out of the way of direct travel. There was at that time hardly any communication over this route for weeks. There was at the same time, a daily and intimate communication between the valley of Wells Creek and the village of Red Wing; yet the latter place did not suffer from the disease until in 1859, when almost every township in the county witnessed cases of diphtheria. Thus we have epidemic diphtheria, whose extension seems to be wholly dependent upon some epidemic influence rather than upon contagion—a true epidemic disease.

The prevalence of the disease continued with short interruptions until 1863; the greatest prevalence being in 1862. In 1863 in Red Wing (not in the country) there was a peculiar prevalence of scarlatina, diphtheria and measles, all at the same time. Often the symptoms of two or more of these diseases occurred in the same case at the same time. There were, perhaps, 350 cases of the disease thus more or less complicated in a population of 3,000. This peculiar prevalence of complicated disease subsided in the winter of 1863-64, the evidence of diphtheritic poison being no longer apparent. Then followed an epidemic of distinct scarlatina and of measles, and the same children suffered from these diseases, who had a few months before suffered from the mixed malady.

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The mortality statistics from 1858 to 1863 were about as follows: Whole number of well marked cases of diphtheria, 150; the mortality about 12 per cent. Population, 2,500 in 1858, to 4,500 in 1863. Doubtful or light cases are excluded from this estimate.

Only a few sporadic cases of diphtheria have occurred in town since the winter of 1863–64.

Previous to the month of November, 1867, the records of vital statistics were not kept in our city: since that time our records give the following exhibit:

In 1867, 5 deaths from diphtheria. These were in November and December. Population, 3,800.

In 1870, 1 death from diphtheria; total number of deaths from all causes, 91; population, 4,500.

In 1872, 3 deaths from diphtheria; total from all causes, 78; population, 5,000.

In 1878, 4 deaths from diphtheria; total from all causes, 83; population, 6,500.

No deaths from diphtheria were recorded in the intervening years.

The hygienic surroundings of apparent spontaneous cases of the disease were varied as the circumstances, habits and residence locations of our people. Conditions the most healthful in every particular are to be credited with a few cases; but as a rule, in low wet situations, and where malarial fevers prevailed in their season, the cases were more frequent; also in boggy, cold, springy valleys surrounded by high hills, and where the soil saturation with cold water did not afford the conditions requisite for the development of malaria. In short, places with the best sanitary conditions have not been exempt, but the most cases have occurred where the reverse has obtained. Insufficient clothing, or a disregard of hygienic requirements in the matter of protection against cold, had a strong influence in the development of the disease.

On the question of the spontaneous origin of diphtheria, and of the further spread of the disease by contagion, the following cases have a bearing:

"I first saw the patient, a young lady, on the 23d of January, 1876. She had been sick a week; diphtheritic exudation extensive; a severe case; no other cases in the limit of my acquaintance. In a few days the mother of the patient was taken with disease of the same type as that of the daughter. Another daughter came home to nurse the sick, and also contracted a mild form of the disease, eight days after her arrival at home. A boy in the same family had a very sore throat at the time of the commencement of the last daughter's sickness, but was not confined to bed. The father had a sore throat with other symptoms of diphtheria, but without exudation. There was no spread of the disease from this family. The home was comfortable, the family well fed and cleanly. The situation was about eighty feet above the adjacent Mississippi river; dry but malarial in the proper season.

Concerning the importation of diphtheria by contagion:—In June, 1878, a child in a family living three miles south of Red Wing, had been on a visit to friends in Wisconsin, had remained there one night and then returned home because the family visited had diphtheria. (A severe form of the disease was then prevailing at that place.) A little less than a week after this exposure, the child was taken sick, and had all the symptoms of a severe attack of diphtheria minus the exudation. In a few days another child in the family was taken down. There was a slight exudation in the throat in this case, but the constitutional disturbance was not so great as in the first case. Finally, all the remaining members of the family had the sore throat with more or less of the usual symptoms of diphtheria, minus the membranous exudation.

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NOTE.—In this instance we have an affection of the throat, evidently from true diphtheritic contagion, existing outside of any epidemic influence, and communicating its contagion from one to the other of the members of a family. Shall we say that this disease is not diphtheritic? It is my opinion that it was, and that its mild form in this family and its failure to spread, was due to the fact, that it did not find here the constitutional conditions and the surrounding influences favoring the development of the malignant form of the disease,

It has always been my opinion that diphtheria often occurs without exudation, when an epidemic is pending or is general in the country. I think that, for statistics, the record should be made only of cases showing the membrane; but for practice, any sore throat not distinctly recognizable as some other form of disease, should be treated for the one in question.

In general, as to the type of the disease acquired by contagion, it may be observed, that severe initial cases were generally followd by other cases of the same type, the epidemic reaching its acme, as to spread and severity, in a certain time, and subsiding with a milder type of the disease. In 1858, however, the first cases were of unexampled severity in the prevalence of the disease up to 1865.

Concerning the nature and behavior of the infection:—The transfer of the disease in its local feature, the exudation from one part to another in the same individual, has been seen in the transfer to the eyes, nose, anus, vulva, prepuce, etc. Lesions of the skin have been the seat of the exudation, even when in situations not handy of manipulation. I saw a fatal case of diphtheria where there was not a trace of the exudation in the throat. The child had received an injury, causing simple abrasion of the cuticle on the hand and foot. There was, at the time, a severe case of diphtheria in the family, which was under my care. The little girl who had suffered the slight injury of the hand and foot, was not under treatment. She became fretful, and the abrasions of the skin extended until about the size of a silver dollar in each situation. At length she was confined to bed and my attention was called to the case. I found the lesions as indicated, but covered with a diphtheritic exudation, and cupped towards the centre, with the edges elevated above the surrounding skin. From the foot up to the groin and lower part of the abdomen, red lines extended, increasingly darker as they extended upward, until in the groin and on the abdomen the discoloration was as dark as a severe bruise, with a tinge of yellowish green. The pulse was small and wiry. The prognosis was speedy death. This was verified in eight hours.

It is not claimed, that in this case the general system was poisoned by infection received through these external lesions, In epidemic times three or four of a family are often taken down about the same time, and the disease in this case may have invaded the system in another way; the exudation in these places merely affording evidence of the condition of the circulatory medium. I have often seen patients thus affected with exudations in little lesions of the derma on the feet, between the toes, (a favorite place on barefooted children) on the hands, lips, &c., when there was also an exudation in the throat.

Diphtheria as influenced by constitutional conditions:—I think that strumous constitutions suffered more when attacked than those free from taint, but I cannot say that such were more apt to contract the disease. In croupous children, the disease was more dangerous from translation to the larynx, but not necessarily more severe as a disease in its usual characteristics of a systemic poisoning.

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Pathology, &c:—The severity of the initiatory attack, in cases from 1858 to 1861–62 indicated the type of the disease. In 1862–63 it did not. The cause of this was noted as due to the complications of the prevailing disease at that time.

The fact that local remedies were generally unefficacious, unless supplemented by constitutional treatment, and that lesions of the skin present when the system was apparently free from septic poison, became covered with the characteristic exudation simultaneously with its appearance on the tonsils, after the initiatory symptoms of chill and fever, and the further fact, that there is often so great constitutional disturbance with so little local manifestation, afford satisfactory evidence concerning the relation of the local to the general disease.

Results and sequelae:—Death results from blood poisoning mainly; from asphyxia in about two per cent. of all cases.

The sequelæ resulting fatally within three years after the date of the disease, have been affections of the lungs, mainly phthisis, and in persons approaching puberty; and (by way of note) these cases were almost all in persons in whom such a result might have been anticipated, the disease having merely confirmed the diathesis and hastened the case towards the legitimate result of that diathesis.

In persons now living, who had diphtheria, say in the years from 1858 to 1865, and had it severely, and in whom no known taint existed previously, I find a lack of constitutional strength. They are easily fatigued and subject to headache, and I think are more likely to suffer from cerebral lesions interfering with the integrity of the optic functions.

Remedial measures, preventive and curative:—Cleanliness, ventilation and good warm clothing. Avoid sudden "cooling off," after unusual muscular exercise; such as going into the cellar, or using cold water on the body when covered with perspiration.

Give a good tonic containing iron and chincona, to the well ones in a sick family, as also to those in the immediate neighborhood. Treat the sick in the same manner. Give soft, nourishing food, in quantity only equal to the assimilative capacity of the stomach. Generally and locally use supporting, stimulating, and antiseptic remedies."

Red Wing, Dec., 1878.

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THE SANITARY

WATER SURVEY OF THE STATE.

The Chemical Analysis of Samples of Drinking Water from Infected Wells in Mankato. A Comparison of the same with other samples from Mankato, St. Paul and Minneapolis.

BY S. F. PECKHAM, STATE CHEMIST.

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THE SANITARY WATER SURVEY OF THE STATE.

Dr. C. N. Hewitt, Secretary State Board of Health:

My Dear Sir—I have the pleasure to submit the following report upon the samples of water submitted to me for analysis by Dr. E. J. Davis of Mankato. They were numbered from one to eight inclusive. The numbers from one to six were examined, and upon ascertaining their character, I advised Dr. Davis to select specimens from wells used by families in which no diphtheria had appeared. He accordingly sent numbers seven and eight. The following table represents the results of the examination.

The top figures signify parts (by weight) in one million parts of water (by weight).
The lower figures signify grains per American gallons of water, (weighing 58,372.2 grains).

LOCATION, ETC.	Total Residue.	Organic and Volatile matter.	Mineral matter.	Chlorine.	Albuminoid Ammonia.	Ready-formed Ammonia.
No. 1.....	467	95	372	12.3	.255	.04
	27.2896	5.5453	21.7955	.7179	0.01488	0.00233
No. 2.....	530	128	402	33.2	.31	.02
	30.9372	7.4716	23.4656	1.8795	0.0181	0.0012
No. 3.....	958	194	764	95.4	.29	.07
	55.9205	11.3242	44.5963	5.5687	0.0169	0.0041
No. 4.....	467	83	384	3.4	.11	.01
	27.2598	4.8449	22.4549	0.1984	0.0064	0.0006
No. 5.....	690	157	533	15.8	.34	.25
	40.8605	9.7481	31.1124	0.9223	0.0198	0.014
No. 6.....	442	28	414	7.0	.12	.01
	25.8005	1.6344	23.1661	0.4086	0.0070	0.0006
No. 7.....	544	87	457	18.6	.115	.11
	31.7544	5.0783	26.6761	1.0857	0.0067	0.0064
No. 8.....	648	86	562	28.4	.21	.15
	37.8347	5.0200	32.8047	1.6577	0.0122	0.0087

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An inspection of these results led me to conclude that the first three waters were particularly bad, and that they were rendered bad from some cause not usually operative, as I had never examined before, any water that showed so large an amount of salt or chlorine and albuminoid ammonia, and at the same time so little ready-formed ammonia. These waters are pure as regards ready-formed ammonia, but very bad as regards the other ingredients.

Number four is a pure water as regards chlorine and ready-formed ammonia. The albuminoid ammonia is not correspondingly low, but is quite low, and probably comes from organic matter in the clay in which the well is dug, or from the wooden curbing. It is, on the whole, a safe, pure water, and no disease has been, I understand, associated with its use.

Number five is an ordinarily bad water, with large chlorine, ready-formed, and albuminoid ammonia.

Number six is slightly contaminated, as shown from the large chlorine.

Number seven is slightly contaminated from a stable, but is a wholesome water.

Number eight is a little more contaminated from a stable, but is not yet unwholesome.

Description of the Wells.

Such was my interpretation of these results. The unusual character of numbers 1, 2 and 3 puzzled me. At your request I visited Mankato, and after I had carefully gone over the groud with Dr. Davis, I learned the following facts.

Number one is from one of the neatest premises that I ever saw. The well is situated on one side of the lot, about sixty feet from the back end of it. On a corner of the back end of the lot is a privy over a vault that is of uncemented stone, about 75 feet from the well. This vault has not been cleaned out for ten years. Kitchen slops have been thrown for the same length of time over the fence into an alley at the back end of the lot.

Number two is also from premises remarkable for general neatness. The well is between the house and the street. Kitchen slops were thrown upon the top of the ground from the back door, at a distance of from twelve to twenty feet from the well. A privy vault, which is a hole dug in the stiff clay, has been used for three years, situated 45 feet from the well, and about 12 or 15 feet farther off is another vault, which was abandoned and covered over three years ago, when the one first mentioned was dug. The cellars on both these premises and number one are plastered and well ventilated, and kept in good order. This lot is situated pretty high up at the base of the bluff, and in the spring the soil fills with water, often filling the well full to the top.

Number three is on a lot very near an old ruined house, beneath which is a hole for a cellar. In the spring this hole fills with water, and soaks away within a few feet of the well. An abandoned privy vault is near the well, but we could not ascertain its exact locality. It had been abandoned for about six years. A privy vault now in use is situated about 60 feet from the well. These premises were generally in a dilapidated and broken down condition.

Number four is from the Pleasant Grove School well. This is a deep bored well, very near the base of the bluff. It is one of the few wells in the town curbed with a wooden curb. The water in this well is entirely normal, with the exception of a very small amount of albuminoid matter, doubtless derived from the wooden curbing, and harmless. This well was not used during the summer

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vacation, and when first used after it, the water for a time had a foul taste, and acquired a bad reputation. It is probably as good or better water than the average of wells, but there are two privies on the lot, situated at a distance of about 70 and 80 feet, that will contaminate the well in time, if they are not cleaned out twice a year and kept pure with ashes or lime.

Number five came from a well on the top of the high bluff. It is on the line between two lots, and was used by both families occupying the two premises. One of the two lots was in fair order, the other pretty dirty. On either of the lots was an ancient privy over a hole of uncertain date, but safely estimated of ten years of age, unless a still older one was covered up near it. One of these privies was 40 feet, the other 50 feet from the well. On looking into the well, the water appeared covered with an opalescent film. Kitchen slops were thrown upon the ground at a distance of from 10 to 50 feet from the well. On looking over an adjoining lot, a well was found in a shed foul with all sorts of rubbish, and on one side of the lot a hog pen of long standing, which had the appearance of having been used for years without cleaning. This pen was about 120 feet from number five, and half that distance from the well in the adjoining lot. The well is at least 50 feet deep, and the water is always low. While the surface drainage is naturally down the slopes of the bluff, the under drainage from the hog-pen and privy holes is naturally along the top of the clay subsoil into the wells.

Number six was found to be a stoned well on the flat towards the river. The well had been dug three years, and at the same time a cess pool was dug fifteen feet from it, which has been used to the present time. Kitchen slops have been thrown on the ground around the well at the same time. The nearest privy is ninety feet from the well, and of unknown date. In other respects these premises were in a neat condition.

Number seven came from premises in a generally tidy condition. A barn had been quite recently built on the lot and quite a large amount of stable manure was lying about on the surface from thirty to seventy-five feet from the well. If this is allowed to lie and accumulate indefinitely the effect on the well will increase.

Number eight was from a well still nearer the river than number six. The premises were well supplied with cess pool and privy vaults at a considerable distance from the well and towards the river. The neighborhood abounds in stables, and the water is very slightly contaminated, apparently from that source. The hopper connected with the wooden sewer leading to the cess pool is almost, if not quite over the well and close beside the pump. As soon as the wood decays the well will become foul from drippings of kitchen slops.

The Wanklyn Process for Water Analysis.

The value of the Wanklyn process for water analysis, which I have used in this examination, has often been questioned, as an indication of the absolutely good or bad qualities of a water for drinking purposes. I do not myself believe that taken *alone* this process constitutes a reliable test, but taken in *connection* with attendant circumstances as a means of interpretation, the results obtained by it are of very great value.

It may be assumed that a pure well or spring water should contain, in solution, a small amount of mineral matter, a very small amount of organic matter of vegetable origin, and the ordinary gases which the water has dissolved from the atmosphere, and the soil in its *natural* condition. In a river or lake water the

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proportion of organic matter of vegetable origin would be increased by natural causes, and at the same time the proportion of mineral matter would be decreased; hence the same amount of organic matter as indicated by Wanklyn's process might be normal to a lake or river water, and abnormal to a well water. Below I give some analyses of water supplied to several of our eastern cities from rivers and ponds. The numbers indicate parts by weight in 1,000,000 parts of water.

Location, etc.	Total Residue.	Organic and Volatile matter.	Mineral matter.	Chlorine.	Albuminoid Ammonia.	Ready-formed Ammo'a.	Date.
*Springfield, Mass .	39.3—6.09	21.6—34.4	16.2—29.9	.....	.229—.591	.035—.247	1877.
†Boston, Mass.....	37.2—55.8	14.0—23.2	19.2—32.6	.....	.099—.173	.005—.056	[ly,'77. July,'76—Ju-
‡Plymouth, Mass..	30.0	14.0	16.0	7.3	.171	.077	June 11, 1877.
‖Mississippi River, 4 miles above Minneapolis.....	185.8	30.2	155.6	17.8	.155	.03	Mar. 18, 1877.
Well in Minneapolis.....	559	151	408	12.4	.08	.02	October, 1878

*Prof. Wm. Ripley Nichols, Report to Water Commissioners, 1878.
†Prof. Wm. Ripley Nichols, Report to Water Commissioners, 1878.
‡Prof. Wm. Ripley Nichols, Report to Water Commissioners, 1878.
‖S. F. Peckman, Report to Health Officer Townsend, St. Paul P. P., March 18, 1877.

When engaged in making the examination of water for the city council of Minneapolis, I advised the examination of a specimen from up the river, another from near the mouth of Bassett's creek, and another from the hydrant. Bassett's creek empties into the Mississippi river a considerable distance above the water works, and on the same side. It is practically an open sewer and empties a great amount of all manner of filth into the river. The three analysis gave the following results. That from up the river is marked 5, and that from near the creek 3, and that from the hydrant 2:

The top figures signify parts (by weight) in one million parts of water (by weight.)
The lower figures signify grains per American gallon of water, (weighing 58,372.2 grains.)

Location, etc.	Total Residue.	Organic and Volatile matter.	Mineral matter.	Chlorine.	Albuminoid Ammonia.	Ready-formed Ammonia.
No. 5..... ..	185.8	30.2	155.6	17.8	.155	.03
	10.854	1.763	9.091	1.039	0.00904	0.00175
No. 3....	235 4	48.2	187.2	18.8	.34	.04
	13.741	2.813	10.928	1.0974	0.01985	0.00233
No. 2....	218.8	35.4	183.4	18.13	.23	.04
	12.872	2.066	10.806	1.0573	0.01342	0.00233

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An examination of these results shows what proportion of the albuminoid ammonia in the hydrant water was due to sewage from the creek, and how much belonged to the river water in its normal condition. These specimens were gathered in February, when the nuisances were frozen up, and the proportion of contamination amounted to 33 per cent. In August of the same year the proportion amounted to nearly 50 per cent., and in August, 1878, the proportion has become still greater.

In a sample of water sent me from a well in St. Paul, the albuminoid ammonia amounted to .40 parts in 1,000,000. Seven cases of typhoid fever in four weeks, occurred in the two families using the water of the well.

About a year ago I examined the water of three wells at Brainerd, with the following results:

The top figures signify parts (by weight) in one million parts of water (by weight.)
The lower figures signify grains per American gallon of water (weighing 58,372.2.)

Location, etc.	Total Residue.	Organic and Volatile matter.	Mineral matter.	Chlorine.	Albuminoid Ammonia.	Ready-formed Ammonia.
No. 49.....	536	120	416	73.2	0.49	1.32
No. 50.....	283	56	227	6.9	0.00	0.00
No. 51.....	641	108	533	100.7	.13	.26

*The remarks made by Prof. N. H. Winchell, who procured the specimens, are that a case of typhoid fever had recently occurred in the family using 49, and that the well had previously been cleaned out, resulting in the discovery of several dead mice.

At the hotel using 51, several cases of typhoid fever had occurred during the summer, the well being in the kitchen, and not properly "protected from surface in drainage."

Number fifty is one of the purest waters that I have examined or found on record.

It will be fonnd, on comparing the foregoing tables that the amount of ready-formed and albuminoid ammonia furnished by the normal river and lake waters is often greater than the amount furnished by the abnormal well waters. Judging from all of the examinations that I have made, I think it is safe to conclude that any excess of chlorine over 12 parts, or ready-formed ammonia over .03 parts, or albuminoid ammonia over .10 parts in 1,000,000 parts of well water indicates contamination, in this part of the country. In other parts of the country, these amounts would be too large.

The Mankato waters may therefore be arranged in several groups, as follows:

Pure.....No. 4
Slightly contaminated with sewage..... " 6
Slightly contaminated by stable..... " 7, 8
Badly contaminated by privy and hog-pen..... " 5
Badly contaminated by privy of long standing..... " 1, 2, 3

*Ibid. See Report State Geologist, 1877, page 28.

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To the use of number 4 no effects can be attributed.

In the family using number six four cases of diphtheria occurred, one of which was fatal.

The families using numbers seven and eight were not affected.

In the three families using number five and the well on the adjoining lot, which is no doubt in the same condition, all of the children, seven in number, that were weaned, were attacked with diphtheria of a very malignant type, and all died.

In the three families using numbers one, two and three, all the children, seven or eight in number, were likewise attacked with a virulent form of the disease that proved fatal in every case.

The significance of these facts can not be too forcibly impressed upon every householder in the State. Whether bad water be a *cause* of diphtheria or not, the results of this research prove beyond question that contaminated water renders the disease much more virulent and fatal. Of the sources of contamination, privy vaults buried, or of long standing, appear to be the worst. Next to these come cess-pools and kitchen slops, and lastly come stables. A privy vault at least should be cemented water tight and thoroughly cleaned twice a year; but a hole in the ground, from which the liquid contents saturates the surrounding soil, and in which the material accumulates for years, is about the most perfect nuisance that can be contrived. The towns of this State are filled with just such ones, and the older the towns the fuller they are.

The remedy is not easy to apply if it can be applied at all. When privy vaults have been filled and buried for years, by former occupants of premises, and their places forgotten, they are not easily removed; and if they were, the soil contaminated in every direction for from fifty to one hundred feet, can not be removed at all.

Properly constructed filtering cisterns, or public water works, are the only adequate or effectual remedies in such a case, and can not be too quickly substituted for the wells now in use.

Respectfully submitted.

S. F. PECKHAM.

MINNEAPOLIS, MINN., Dec. 11th, 1878.

The following results have been obtained by Mr. John Goodnow, a student in the University laboratory. The specimens were taken at my suggestion, from such points in the river as would admit of a comparison with the results that I obtained in 1876:

"Specimen number one was taken from the middle of the Mississippi river at a point about 40 rods above the upper bridge in the last of July or the first part of August, 1878, after a long, hot spell when the river was very low.

Specimen number two was taken from the river directly above W. C. Baker's saw mill, Sept. 7th, 1878, after the close of the hot season, and when the river was at about its nominal (summer) volume.

Specimen number three is hydrant water taken from the mains Sept. 3d, 1878, under the same conditions as those of specimen two."

This description of the specimens is Mr. Goodnow's, but I think his estimate of the stage of water in September is slightly incorrect, as I believe the river has not been as high as usual at any time for at least a year.

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Memorandum of Water Analysis by Mr. John Goodnow.

The top figures signify parts (by weight) in one million parts of water (by weight.)
The lower figures signify grains per American gallon of water (weighing 58,372.2 grains.)

Location, etc.	Total Residue.	Total hardness	Removable hardness.	Common Salt.	Albuminoid Ammonia.	Ready-formed Ammonia	Ammonia from Nitrates and Nitrites.
No. 1.....	170			2.000	0.70	0.03	6.000
	9.923	7.588	3.294	0.166	0.408	0.0175	0.35
No. 2.....	250			2.000	1.07	0.02	24.0
	14.593	7.880	2.919	1.660	0.624	0.0116	1.400
No. 3.....	215			2.000	1.95	0.02	26.4
	12.550	8.172	4.066	1.660	0.1138	0.0116	1.541

Number one is a good river water containing an amount of albuminoid material that would be large if its source was not known to be vegetable matter dissolved by the water in its long course from the swampy regions in the northern part of the State, where the river has its source. This amount is larger than when I examined the water in 1876, but this fact is accounted for by the very low stage of water at the time.

In number two the albuminoid ammonia is increased about 60 per cent., and in number three about 150 per cent. In number two the nitrates and nitrites have increased 300 per cent., and in number three they have increased about 350 per cent.; both these ingredients indicate contamination to a serious extent. The larger portion of it comes from Bassett's creek, and is produced by dung heaps which are undoubtedly the most innocent source of such material. But the water in the city hydrants is a bad water and can only be made better by carrying a service pipe to a point some distance above the upper bridge.

This work I deem of great importance. The at present circumscribed use of the hydrant water for domestic purposes will extend to wider limits as the population in the city concentrates, and an epidemic of some of the diseases due to such causes will almost inevitably result from neglect to secure that supply of pure water which is essential to general and individual health. I hope the Board of Health will not fail to impress the importance of this subject upon the attention of the proper authorities.

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REPORT ON

DUST FIRES AND EXPLOSIONS.

By PROF. L. W. PECK, University of Minnesota.

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DUST FIRES AND EXPLOSIONS—THEIR CAUSE AND ITS PREVENTION.

BY PROF. L. W. PECK, UNIVERSITY OF MINNESOTA.

Dr. C. N. Hewitt, Secretary State Board of Health:

SIR:—In accordance with your request for a short article upon the nature of dust fires and explosions, with suggestions as to methods of preventing the same, allow me to present the following:

When particles of combustible dust are near enough together to catch fire one from another, and at the same time far enough apart to be surrounded by air, a fire will spread through the mass *instantly*. If such a cloud of dust is in a confined space, the expansion caused by the intense heat produced by the instantaneous combustion is practically irresistible and an explosion follows.

Such clouds are necessarily common in a flour mill, but are almost always in confined spaces where naked lights or fires under any circumstances should not be introduced. Great precaution should be taken that such clouds do not form from dust allowed to accumulate through a careless neglect to clean a mill thoroughly and often, thus engendering a general fire or explosion. One source of danger is at the stones from which sparks may come from the friction of one stone upon the other, or from some foreign substance getting accidentally between them. These sparks set fire to the dust carried off by the exhaust. This source of danger will probably be corrected by a method now being introduced, by which the exhaust is made to pass through partitions of cloth, which allow the steam to escape, but stops the dust or flour, thereby preventing a cloud in the exhaust spouts.

But probably ninety-nine per cent. of the dust fires originate from lanterns and other lights which are improperly protected, or rather not protected at all. Such fires do not originate, as a general thing, by placing the lantern in a bin or spout full of dust, but from a cloud of dust striking it with great force, much as if an opening were made at any point, from which flour would flow out in great quantities, or as it would come when sudden jars open cracks in floors, &c.

The problem to be solved, then, is to construct a lantern which will not allow the dust to enter, even if it is forced upon it with great power. I am making at present some experiments looking to this end, the results of which are to be given in a lecture before the State Fireman's Association, and have been able to demonstrate the following:

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Wire gauze, or perforated tin, placed on the top or bottom of a lantern, or at both top and bottom, is no protection, as dust can be blown through, and the flash within will pass through the gauze and communicate fire to the dust without. *Two* sheets of finely perforated tin, placed half an inch apart, allow dust and fire to pass readily through them.

From results already obtained by experiment, I am led to believe that an arrangement similar to the following will give the desired result. Close the top and bottom of the lantern by three or more plates of tin placed horizontally about one quarter of an inch apart, and arranged with holes through them as follows: commencing, say, at the bottom. The lower plate is perforated with holes near the right side. The next plate above has holes near the left side. In the next above the holes are in the right side; and so on through as many plates as desired, the top to be arranged in the same way. The air then would enter at one end of the lower plate, pass between the plates and through the other side of the second plate; then across again between the second and third plates, and then through the third; and so on into the lantern.

With such an arrangement, the force of the dust is completely broken upon passing through the first and striking the second plate. Hardly any dust enters the lantern under the most favorable conditions that can be contrived for getting it in, and no flash is produced.

L. W. PECK.

UNIVERSITY OF MINNESOTA, Jan. 9, 1879.

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YELLOW FEVER.

Its History in the United States; An Account of the Recent Epidemic in the South and the Conclusions of the Yellow Fever Conference at Richmond, Va., in 1878.

BY D. W. HAND, M. D.

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YELLOW FEVER.

BY D. W. HAND, M. D.

The terrible epidemic which ravaged nearly all the lower portion of the Mississippi Valley in 1878, has justly alarmed thinking men all over this country, and even we of the extreme North, cannot hold ourselves exempt.

It is true, in recent times yellow fever has been mainly confined to the seaport towns of our southern States; but in the past it has prevailed extensively in northern cities. Its first appearance in the United States was at New York in 1668; then at Boston in 1691. It reached Philadelphia in 1695, and Norfolk in 1747. In 1798 it prevailed exclusively at Quebec and Halifax. In most of these cities it kept reappearing for a long period. Boston had six epidemics between 1691 and 1798; and between 1695 and 1820, Philadelphia had thirty-one. The epidemic of 1798 was here particularly violent. More than three-fourths of the city population fled to the country, and of those who were attacked two out of every five cases died. This degree of mortality has only been exceeded by the Asiatic plague.

In 1852 Dr. La Roche, a well known author of Philadelphia, wrote thus: "Few cities beyond the tropics have been as repeatedly visited by yellow fever as Philadelphia was prior to 1820. In few has it spread more extensively than it did during some of our epidemics, and certainly in none within the limits of this country has it assumed a more malignant garb, and given rise to a greater ratio of mortality among those attacked. Nay, it may be doubted whether the records of West India or European epidemics exhibit more than a few instances in which the disease has proved more extensively destructive to human life." During the last fifty-eight years Philadelphia, as well as most cities of the North, has been exempt from any violent epidemic. A few cases have been seen both there and at New York, at the quarantine, stations nearly every year, but there was no apparent tendency to spread.

During this time, however, it has ravaged most of our southern cities. In some reappearing again and again, and in others disappearing after a single violent onslaught.

In New Orleans, where it has appeared more or less violently nearly every year, the epidemic of 1853 carried off 5,500 persons; and in 1855, at Norfolk and Portsmouth, Va., where it has not been of frequent occurrence, about 3,000 persons died from it. Nearly the whole population that remained at home, estimated at about 12,000, took the disease. The medical committee appointed by the city councils, to report on this epidemic, say: "The number of deaths was

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about 3,000, or one-fourth of the entire population remaining in the city. When we consider that half of this population was black, among whom there were few deaths, it seems probable that more than one-third of all the whites attacked died."

Of late years the visitation of this pestilence has been so frequent in some parts of our country, they can scarcely be enumerated; but all will recall the serious epidemics at Memphis, Tenn., and Shreveport, Louisiana, in 1873, and the dreadful scourge which swept Savannah and Brunswick, Ga., in 1876.

About the history of yellow fever, we know only this: That it was not known in Europe previous to the discovery of America; that Columbus and his men in the West Indies described a new disease which was very like the yellow fever, as we now know it, and that ever since that time the disease has found a home in Spain and Portugal, along the south shore of the Mediterranean Sea, and along the west coast of Africa. On this side of the Atlantic its principal habitat appears to be in the West India islands, but it prevails at times around the whole shore of the Gulf of Mexico, along the entire coast of Brazil, and on the Pacific side of our continent, from the Gulf of California to Chili. It is unknown on the east coast of Africa, in Asia, and in the East Indies.

A recent writer in Harper's Magazine has well said that "yellow fever, like cholera, is one of the great migrating diseases. Starting from some point within the tropics, it travels steadily onward from point to point as long as it does not meet freezing weather; and it travels north by preference—comparatively seldom to the southward of the zone from which it sets out. Thus Brazil has suffered comparatively little from its epidemic visitation, though the disease long ago planted its germs in Rio de Janeiro, Its favorite course is towards the North. Upon our Atlantic coasts, as on the coast of the Mediterranean, it comes from time to time in one of those immense waves that know no bounds, and stop at no impediment. The distance to which the disease extends, seems to depend much upon the strength of the wave; it first strikes the gulf and *generally* goes no farther."

It is not believed that the disease can extend any considerable distance through the air, and its usual mode of progress is along the lines of travel and commerce; carried, how shall we say? The germs—yes, we must recognize the germs, although as yet they have not been discovered by the most powerful microscope —are carried by the human body, by clothing, by ships or freight, py sleeping cars and baggage. At seaport towns the disease is most often brought by ships, and generally makes its first appearance near the dock or wharf, while at New Orleans and Memphis it has sometimes appeared first at points remote from the river. The poison usually clings to the ground, and in the worst infected districts, repeated instances have occurred where persons have remained in the upper stories of high buildings and have escaped.

Once epidemic in a town, the disease spreads by gradual progression from house to house. Many times this progress has been noticed to be regular and at the rate of about forty yards a day, or a mile in five or six weeks. All are equally liable; the clean and the filthy, the high and airy situations as well as those worst drained and cared for.

While the disease is one of hot climates, it may occur wherever there is long continued heat; it is said an average daily temperature of 75 to 80 degrees, kept up for several weeks, is all that is required, and no latitude or altitude can claim exemption where this condition is found. Even the cool nights of Minnesota may not entirely protect us. As in times past the disease has prevailed as far

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north as Quebec, it may do so again; and the intimate connection we now have with the towns on the lower Mississippi may yet be the means of bringing the curse to us.

The poison which has for months past been spreading over the whole lower valley, may not yet have spent its force. Cold checks, but unless very severe, does not destroy the poison. Often it lies dormant during the winter, and with the return of warm weather again begins its ravages.

Is yellow fever contagious and may it originate anywhere outside of the West Indies? These questions have been fiercely debated ever since the introduction of the disease into Spain, and are not yet settled. They never will be if we are to look on this fever as having always the same special character. The only reasonable explanation of the disease (opinions held by medical men on this subject) is that they see it under different circumstances. It is a disease having many peculiarities, and to it may well apply the remarks of Prof. J. L. Cabell, the able president of the American Public Health Association, on the "Etiology of Typhoid Fever." He says: "Is there anything strange in the fact that typhoid fever, which ordinarily seems but slightly or not at all contagious, becomes, under certain circumstances, unmistakably so? Do we not witness corresponding facts with regard to other diseases? At one time, scarlet fever or diphtheria, if imported into a community, or appearing there in some unknown way, exhibits no disposition to spread; a few scattered cases may occur, affecting, perhaps, a single number in each of several families. At another time, the same disease, once introduced, spreads like fire in a prairie, and in a short time becomes epidemic throughout the community. We see here the influence of those "epidemic constitutions" of the atmosphere, which we cannot ignore, however little we understand them. Even smallpox in the degree of its contagiousness and diffusibility at different times, displays its influence in the most unequivocal manner. We have only to admit that typhoid fever is subject to similar influences, to understand that, while ordinarily sporadic and apparently non-contagious, it now and then prevails as a true epidemic, and even becomes directly contagious."

We must recognize the "epidemic constitution" as affecting yellow fever, and while there may be doubt expressed as to the importation of the original germs, or spontaneous generation in this country, and as to the contagiousness or not of the disease, there can be none as to the importance of preparing ourselves to meet it. In an able paper on the "Germ Theory of Disease", by Prof. Richardson of Philadelphia, he says: "Great benefit would result from its being understood by every man, woman and child, that the contagion of small-pox, yellow fever, typhoid fever, scarlet fever, measles, diphtheria, cholera, etc., is probably composed of exceedingly minute seeds called spores, so small that a mass the diameter of one of the dots or periods (.) upon a printed page, might contain over fifty millions, and that each one of these fifty millions of seeds is capable, under favorable circumstances, of reproducing its kind with almost inconceivable rapidity."

He further says, "The germ theory teaches us that every new case of a contagious malady is the immediate offspring of a preceding case, and the direct result of exposure of an unprotected human being to the chance of having the spores or or seeds of disease implanted in its system; *an exposure which it only required sufficient knowledge, sufficient foresight, and sufficient care, to avoid.*"

By a proper quarantine, we may prevent the entrance into a community of these living germs; and by judicious sanitary arrangements, scrupulous cleanliness and perfect drainage, we can secure an atmosphere in which such noisome germs will not thrive.

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That the foul air and filthy surroundings of a town greatly increase the intensity of epidemic influences, is universal testimony. Dr. Dowell, of Galveston, Texas, a well known authority on yellow fever, says that "nothing is so important in the prevention of yellow fever, as proper water supply and sewerage, and that the disease cannot be taken in a pure air from persons, clothing, trunks or black vomit; but in an impure air, other things being suitable, it can be taken from either." While recognizing the probable fact that the original home of yellow fever was in the West Indies, I am well assured that it has again and again been developed in the seaboard towns of the United States; and that it will be so again. A judicious quarantine may be of service, but the most absolute non-intercourse with the West Indies will not prevent, at times, the spread of yellow fever in this country. The one fact of which we are sure, is, that the thorough cleansing and draining of our towns and cities, will take away from the disease its worst features, and will probably check its epidemic influence.

It is a singular fact that while most of the physicians in our southern sea-coast cities, who have seen yellow fever over and over again, agree that it is often of local origin; no visiting committee, whether self-appointed or otherwise, ever failed to report that they had found some vessel that had brought it in.

It is well to look at the reports of some of the worst epidemics. In 1793, and again in 1797 and 1798 the epidemics, which in those three years carried off over 10,000 of the then small population of Philadelphia, were believed by the physicians of the period to have been imported and to be not contagious.

The committee appointed to investigate the cause of the epidemic of 1853, at New Orleans, which killed eight thousand persons, reported that it was imported, and was contagious. The medical commission before referred to as having been appointed by the city council to investigate the cause and origin of the yellow fever of 1855, at Norfolk, say in their report: "We are unanimously of the opinion that it was introduced by the str. Ben. Franklin, from St. Thomas, and there is no reason to suppose that we should have been visited by the epidemic, but for the arrivals in our harbor of this or some other vessel with the fever on board." They further say: "In no case that we have known or heard of, was there the least reason to suspect that the disease was contagious. Many hundreds of our people flying from the pestilence, sickened and died in the neighboring counties and cities; in hotels and private houses, in infirmaries and hospitals, under all possible varieties of place and circumstance; and yet we have not heard of a single instance in which it was even alleged that the disease was communicated to the attendants or friends."

In 1864, I encountered an epidemic of yellow fever at Newbern, N. C., which was very severe. Of a white population estimated at 4,200, most of whom took the disease, over 1,200 died in about six weeks; and in that time the epidemic influence *gradually* spread over the whole town. This epidemic was positively not contagious—personal contact with the sick was in no case known to cause the disease. Large numbers of the exposed citizens and soldiers were sent to other towns in the vicinity, and to numerous farm houses, where many of them sickened and died of the fever, but nowhere did any person not exposed at Newbern, take the disease, except at one place, Beaufort. This town was badly overcrowded with white and black refugees from the burned towns, Plymouth and Little Washington, and was very filthy. Here a few cases of the fever from Newbern started an epidemic which swept over most of the place and was very fatal. The epidemic influence here, as well as at Newbern, became so strong that persons merely riding through the streets, and without stopping, took the

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disease. While so sure were we of its non-contagious character, that dozens of yellow fever patients from Newbern were admitted to the Morehead City General Hospital and placed indiscriminately in the wards with other patients, yet in no single instance did any patient or attendant take the disease.

Nor could any proof be found of the disease having been imported. Newbern is situated forty miles inland, on a river at that time strictly guarded by gunboats, and was under such rigid martial law, it seems impossible any infected person or thing could have been brought there without our knowledge. Every effort was made to trace any possible source of importation. but always without success. Of the twenty-two medical officers, all northern men who were with me during that epidemic, eleven died of the fever, but all the others, when the epidemic was over, joined me in the report that it was of *local origin*.

How different has been the epidemic of 1878!

The sixth annual meeting of the American Public Health Association convened at Richmond, Va., November 19th to 22d, for the special object of learning and analyzing the evidence concerning this epidemic. Dr. C. N. Hewitt and myself attended as delegates from the State Board of Health, and we there met men from all parts of the country, anxiously searching for information as how best to prevent a return of the pestilence.

We learned that the steamer Emily B. Louder arrived at New Orleans May 23d, from Havana, and that her purser, named Clarke, who was sick on arrival, died May 26th, of what the attending physician said was malarial fever. An engineer named Elliott, from the same vessel, died May 29th, and this case, although having had no black vomit, and presenting none on the post mortem examination, was thought by some of the physicians who saw it, to have been yellow fever.

The disease, if it was thus introduced, required nearly two months to infect the atmosphere of that most wretchedly drained and filthy city. The first *recognized* case of yellow fever occurred July 21st, full three miles in a direct line from those cases of the Louder; and the disease soon spread over a considerable portion of the city.

While it is not altogether clear that the epidemic was imported into New Orleans at this time, it is probable that most of the cities and towns in the lower valley, received the germs of the fever from that place; and the testimony of nearly all those brave men who, as physicians and nurses, fought the disease from place to place, is, that it was contagious; that is, the disease was directly communicated from one person to another. They report dozens of instances where persons from New Orleans or other infected places, carried the disease to other towns, and even communicated it to other parties in isolated farm houses. No more fearful tales of the *plague* in Europe were ever told.

The commission appointed to examine into the causes of this epidemic, and whose report was considered at this meeting of the American Public Health Association, was composed of most able and impartial men. They have accepted the theory of importation by the steamer Emily B. Louder, and are satisfied the disease was contagious. In consequence, they report strongly in favor of quarantine, inland as well as maritime. In their opinion, absolute non-intercourse with those exposed to the disease, was the only safety. They positively state that towns, which, like Natchez, Miss., shut themselves in and held no intercourse with the outside world, escaped the pestilence, while it was spreading all around them; and that the same held good at some farm houses, where the head of the family sat all day long, with a shot-gun, on the porch, and

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allowed no one to come through his gates. These facts, they claim, show the immense importance of a rigid quarantine; but other observers, men careful and calm in the face of a great danger, say this same immunity existed at Huntsville, Ala., and other towns, where no barbarous ordinance kept out the sick and weary refugees from infected districts; also, that at many farm houses where all were welcomed, and where many sickened and died of yellow fever, there was no spread of the disease to other members of the household.

In a letter just received from Dr. D. C. Holliday, one of the oldest and most respected physicians of New Orleans, he says: "That yellow fever could be supposed to be contagious is simply ridiculous; that it is imported, possibly may be the case, but it requires some local condition necessary for its nurture and spread, without which it may be and often is imported with impunity." He says farther, that "the *germ* theory, if adopted, will be the strongest argument against the establishment of an effective or really protective quarantine."

Considering all these conflicting views, it is not strange the Richmond convention failed to make a definite report. Too much seems to have been expected of it. It was absurd to suppose that any body of men, however able, (after three days' consideration of the hastily prepared report of a greatly overworked committee on one epidemic alone,) could settle questions which have confused and violently agitated the best observers for over two hundred years. And it was unjust to expect the Public Health Association on this slight examination to recommend *positive* legislation on so important a question as national quarantine.

What we did agree upon were the following propositions:

"4. It is the duty of the general government to appoint a commission of experts to make a thorough investigation into the causes of yellow fever, and the best methods of preventing its introduction into this country, and to make such an appropriation as will permit of the securing the services of the best men and of the best means for carrying out such investigation.

"6. That whatever may be the practical value of quarantine, there is no doubt of the importance and value of internal sanitary measures in the prevention or modification of epidemic yellow fever, and that this Association strongly urges upon State and municipal authorities the great amount of responsibility which rests upon them on this account at times when no disease is prevalent or threatening."

We recognized the value of a properly conducted quarantine at our seaport towns, but did not believe that it could be relied on as an absolute protection.

Virtually, in times past, the quarantine at most of our southern cities, has been a farce. Vessels from infected ports, and many of them with yellow fever on board, were detained two or three, or at most ten days, their cargoes undisturbed and their holds only indifferently fumigated, when they were allowed to go up to the wharves and discharge passengers and cargoes. Yet these cities had yellow fever only irregularly; in most of them not oftener than every second or third year, and they escaped entirely many seasons when infected vessels lay at their wharves. Dr. R. A. Kinlock, of Charleston, S. C., explains this fact by saying, "the 'epidemic constitution' must differ in different years, even in the same locality. The rule obtains in southern latitudes (in the yellow fever zone) as well as in northern regions, that epidemicity is greater or less one season as contrasted with another. In the West Indies it is a well known fact that epidemic disease does not occur every year. In some places the disease may be found restricted (that is a few sporadic cases occurring) while neighboring towns in close communication are suffering from widespread epidemics. The epidem-

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icity this year so fearfully illustrated in the Mississippi Valley, *cannot be accounted for by any mere importation of germs at one or a dozen points.*"

National quarantine, as provided for by the act of Congress approved April 29, 1878, has proved of little advantage except to give the authorities at Washington more prompt and accurate notice of prevailing epidemics. It has not yet been of use in keeping them out of the country. An attempt is now being made to induce Congress to pass another and more stringent quarantine law, absolutely stopping all intercourse between the West Indies and our seaport towns, between the 1st of May and the 1st of November. It ought not to be passed. In a paper read before the International Medical Congress, of 1876, by Dr. John M. Woodworth, Supervising Surgeon General, U. S. Marine Hospital Service, he says: "It is unreasonable as it is impracticable, to apply a theoretically uniform quarantine to all places. * * * The question should be settled separately and practically for each country or place, by taking into account the liability to infection of the port of destination; the period of incubation of the disease, the length of time consumed in the passage, and the measures enforced by the vessel *en route*. These quarantine measures (under direction of a proper medical officer should commence as soon as a vessel has left an infected port." Dr. Woodworth farther praises the practice of medical inspection and sanitation, as adopted and carried out at the New York quarantine, and thus describes it. "If, upon arrival from any infected port, it be found that a vessel is clean, and that no case of sickness has occurred on board during her voyage, any detention of passengers and crew beyond the time required to thoroughly air and disinfect their baggage and dunnage, is believed to be unnecessary, provided that the period of incubation of the disease has passed during the voyage. If cases of yellow fever have occurred during the passage, the passengers and crew are removed from the vessel; the sick, if any, placed in hospital, and the well detained in a comfortable, healthy place, until five or six days after the occurrence of the last case, when they are allowed to proceed to the city. Meantime, the vessel is at once subjected to a thorough airing and fumigation, and the cargo transferred to open lighters in the bay, by men kept for the purpose. During the unloading, the vessel is daily fumigated, and when the transfer is completed, every available part is cleaned with water, and after a thorough disinfection and fumigation, the vessel is returned to commerce."

The same general plan is followed at Boston, except that they do not require the cargoes to be broken and transferred to lighters; fumigation of the vessels between decks being thought sufficient. Such extra hazardous cargoes as old rags, &c., are not allowed to go up to the city at all until after cold weather sets in.

The quarantine regulations of New Orleans, which this year signally failed to do any good, are approvingly quoted by Surgeon Ely McClellan, U. S. A., in his report on the cholera epidemic of 1873. Of them he says: "The quarantine regulations of the port of New Orleans, requires that all large steamships carrying passengers should be provided with a medical officer. That at infected ports all passengers shall be subjected to an examination, and any person found to be predisposed to the disease shall be rejected. That all baggage shall be exposed to the air and disinfected or fumigated as soon as possible after coming on board, and again before arrival at the quarantine station.

"That before receiving cargo at infected ports, the vessel shall be thoroughly cleansed and disinfected. That so far as practicable the hatches be kept open, both while in port and at sea, and that effort be used to freely ventilate all parts

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of the vessel. That the process of disinfection be repeated every five days, and that when the cargo is broken, the hold shall be fumigated with sulphurous acid or chlorine gas.

"That at infected ports as little communication as possible with the shore shall be allowed the officers and crew of vessels, and that sleeping on the deck be permitted to none. That at the close of each day, while in yellow fever ports, all the crew shall wash their entire persons, and leave off all the clothing worn that day, which shall be washed before being again taken into use, and that after leaving port all mattresses, bedding and clothing be sunned and aired for several hours. This last procedure to be often repeated during the voyage.

"All vessels, upon arriving at the quarantine stations, are subject to an especial process of disinfection, which consists of forcing into the holds large quantities of sulphurous acid gas.

"At the same time carbolic acid is freely used in the bilge, forecastle, &c. After breaking cargo, this process is repeated.

"The detention required is a period sufficiently long to allow ten days to pass between the departure from and arrival at port.

"Individuals sick with the infectious disease are removed to hospitals, and the detention of the vessel is reasonably prolonged."

In regard to inland quarantine, Dr. J. M. Woodworth, in the paper before referred to, says:

"Absolute quarantine by land is impracticable," and Dr. Kinlock, writing at Charleston, says, "In years gone by we never entertained the hope of land quarantine preventing the spread of the disease; and its diffusion or march into the interior, with rare exceptions, never took place." "Now, upon a mere assumption of the knowledge of the laws of a disease of which we know so little, the most arbitrary regulations have been attempted.

"People flying from a stricken city have been driven back to die. Refugees from a pestilence have been hunted down, and upon the *possibility* of their introducing disease (after they had already been the carriers of the poison, if such a thing were possible,) have been charitably shipped to the nearest sister city, who in turn was expected to protect herself. This selfish, arbitrary and unreasonable action was practiced by cities hundreds of miles away from the infected regions, and in northern as well as southern latitudes. The law of self-preservation, as interpreted in these times, contained no provisions for a brother's welfare."

Dr. Coan, the writer in Harper's Magazine, before quoted, says:

"Experiment and long experience indicate that yellow fever is not communicable from one human body to another. It can only be taken from infected *things* and from infected *places*. And when its germs have once been planted in a given place, they remain latent there for more than a single season. Following years see a renewal, usually in a milder form of the epidemic, until, finally, in a northern climate, the disease spends itself, and does not return until it is borne northward again upon one of the great epidemic waves from the Gulf of Mexico. Against the epidemic onslaught of such a disease as this, the mere quarantine of persons can be of little use, for the poison not only travels in its own dark way, but develops its strength in the porous substances which carry it."

A temperature below the freezing point of water, 32° F., or above the boiling point, 212° F., will destroy the germs. Fumigation with sulphur or chlorine will no doubt do the same, but it must be thorough. Every dark corner, and every stray garment must be reached by the penetrating gases. The ordinary disinfectants, so called, are worse than useless. They deodorize foul places, and gracefully cover up the poison, but they do not kill it.

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As in the case of typhoid fever, all persons are not equally liable to yellow fever. Even in the worst epidemics, some are exempt, and more than half of those attacked recover.

One attack almost always exempts from a second, if the person remains in a southern climate. In its preferences, yellow fever is essentially a disease of mature years, but children frequently take it, and in the epidemic of this year many of them died with it. When old persons have it they nearly always die. Negroes are not exempt, but they have it in a milder form, and comparatively few die.

The period of incubation is about one week. It may be only one day, or it may be two or even three weeks. The disease runs its course in about ten days. In fatal cases the average duration is about five days. Black vomit is the most dreaded symptom. It comes about the fourth or fifth day, and few recover after it appears.

Preceding an epidemic of yellow fever, there is always a marked increase in the severity of prevailing diseases. Malarial fevers, particularly, assuming a congestive form, and during the prevalence of the epidemic, those who do not take the disease will be depressed and indisposed. It is even claimed that animals and vegetables are affected by it. Dogs, cats, rats, &c., have been known to die in large numbers, either just before or during an epidemic of yellow fever; and it is certain that during unusually sickly seasons, potatoes, celery, cabbages, peaches, &c., have failed to thrive in their natural way.

Fortunate, indeed, will it be for this country, if an unusual degree of cold penetrated the extreme South this winter, and thus kills the millions of germs so widely spread and planted there. Then only can we feel that the epidemic wave of 1878 has spent its force, and we are safe for another year.

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THE METEOROLOGY OF MINNESOTA.

FOR 1878.

COMPILED BY W. H. LEONARD, M. D.

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METEOROLOGY OF MINNESOTA.

BY W. H. LEONARD, M. D.

MINNEAPOLIS, NOV. 1878.

To the Minnesota State Board of Health.

GENTLEMEN:—In the following tables are compiled the meteorological observations from nine different stations within the State. They consist of the monthly and annual mean temperature and humidity of the State, and the highest and lowest monthly for each station from Nov. 1st, 1877, to Oct. 31, 1878. Also means for the winter, spring and summer of 1878.

These observations have been furnished by gentlemen who have volunteered to do a work requiring much patience and faithfulness to perform. They have the thanks of your committee for its execution. The board have, on several occasions, recognized their labors in this direction, and I have no doubt will be ever ready to do so again.

The following is a list of their names and stations:

J. E. Bowers, M. D., St. Peter; S. Marlatt, Esq., St. Cloud; Franklin Staples, M.D., Winona; Solomon Blood, M.D., Owatonna; W. H. Pratt, M. D., Stillwater; and William Cheney, Esq., Minneapolis. Also I have been kindly furnished data from the observations of the U. S. A. Signal Service Stations in the State, viz.: Sergt. R. J. Lewis, at St. Paul; Sergt. H. Bessant, at Duluth; Sergt. B. C. Anderson, at Breckenridge.

There is also added some comparisons of the temperature and precipitation of different sections of the country, taken from the signal service U. S. army.

W. H. LEONARD.

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COMPARISON OF AVERAGE TEMPERATURES.

	January.	February.	March.	April.	May.	June.	July.	August.	September	October.
Minnesota	21.2	30.9	41.3	46.8	53.3	65.2	71.4	70.5	58.6	48.8
New England	27.3	30.1	39.2	49.3	56.2	63.4	71.5	68.3	62.9	50.0
Gulf States	48.6	53.2	65.4	70.0	75.2	80.7	83.8	.....	.....	67.1
Ohio Valley	37.2	40.4	53.7	61.4	65.6	71.5	81.4	78.4	69.1	55.8
Upper Missouri Valley	19.6	30.5	41.9	49.0	52.6	66.3	74.5	72.8	57.4	44.3
Pacific Coast	50.0	51.4	54.2	55.1	59.4	62.7	63.6	64.4	61.7	59.6

COMPARISON OF AVERAGE PRECIPITATION.

	January.	February.	March.	April.	May.	June.	July.	August.	September	October.
Minnesota	0.43	0.36	2.79	5.29	2.61	4.74	3.85	2.20	2.56	1.45
New England	5.27	3.34	4.66	5.01	2.73	3.78	3.52	4.86	2.55	4.10
Gulf States	4.41	3.26	4.29	5.22	5.15	6.80	5.53	.....	.....	3.36
Ohio Valley	3.25	1.83	3.09	3.85	3.22	4.46	4.16	3.00	3.41	2.90
Upper Missouri Valley	0.10	0.33	1.19	5.42	3.59	5.30	4.70	1.62	1.01	1.10
Pacific Coast	6.74	8.67	2.98	1.96	0.37	0.13	0.00	0.50	0.27	0.46

TABULAR VIEW OF SEASONS.—MINNESOTA BY STATIONS.

	Winter of 1777-8.		Spring of 1878.		Summer of 1878.	
	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.
St. Cloud	27.48	68.54	46.10	69.11	69.64	76.78
St. Paul	27 05	75.85	50.20	60.16	70.76	70.06
Duluth	29.36	77.10	44.40	69.00	67.16	68.73
Minneapolis	26.87	80.60	48.95	66.16	68.97	74.10
Winona	30.17	61.68	50.12	74.91	71.43	67.38
St. Peter	30.20	78.51	43.20	70.66	70.76	77.68
Owatonna	26.56	65.71	44.39	61.81	67.00	70.55
Stillwater	31.16	75.03	51.49	60.75	71.21	68.69
Breckenridge	23.80	86.03	46.00	72.16	70.10	75.06

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Table of highest and lowest temperature and humidity, by stations.

MINNEAPOLIS, 1877 AND 1878.

	Highest Temperature.	Lowest Temperature.	Highest Humidity.	Lowest Humidity.
November	54	7	47	6
December	52	9	51	8
January	36	—16	34	—17
February	53	1	46	0
March	65	19	55	18
April	76	30	70	28
May	75	37	66	34
June	87	49	76	47
July	93	62	81	59
August	90	55	77	53
September	89	36	72	34
October	70	15	61	13

WINONA, 1877 AND 1878.

November	55	5	45	3
December	60	16	57	14
January	43	— 8	35	—11
February	56	17	45	14
March	———	———	———	———
April	73	37	64	32
May	74	40	67	34
June	89	54	78	51
July	95	62	83	58
August	98	55	83	52
September	97	37	79	36
October	———	———	———	———

ST. PETER, 1877 AND 1878.

November	54	6	47	5
December	58	10	54	9
January	36	— 7	34	— 8
February	58	— 4	48	— 4
March	65	24	60	24
April	73	30	69	30
May	79	36	74	34
June	87	53	76	50
July	93	60	84	57
August	89	57	79	54
September	92	36	76	36
October	72	18	62	18

ST. CLOUD, 1877 AND 1878.

November	59	8	45	7
December	48	6	45	3
January	38	—15	34	16
February	51	9	45	7
March	62	22	54	20
April	70	33	60	30
May	73	36	70	30
June	85	49	82	48
July	96	60	90	56
August	85	55	77	50
September	89	37	80	37
October	70	13	68	12

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ST. PAUL, 1877 AND 1878.

	Highest. Temperature.	Lowest. Temperature.	Highest. Humidity.	Lowest. Humidity.
November	53	4	—	—
December	—	—	—	—
January	37	—13	—	—
February	55	3	—	—
March	64	21	—	—
April	76	30	—	—
May	79	33	—	—
June	87	48	—	—
July	96	57	—	—
August	94	52	—	—
September	94	36	—	—
October	72	15	—	—

DULUTH, 1877 AND 1878.

November	52	6	—	—
December	48	1	—	—
January	38	—13	—	—
February	48	11	—	—
March	62	17	—	—
April	66	27	—	—
May	70	32	—	—
June	88	41	—	—
July	96	55	—	—
August	92	49	—	—
September	83	33	—	—
October	64	8	—	—

OWATONNA, 1877 AND 1878.

November	52	3	44	2
December	53	10	51	7
January	40	—11	37	—14
February	57	4	54	2
March	65	21	55	18
April	75	31	61	25
May	75	36	64	31
June	88	50	77	47
July	93	58	84	54
August	86	54	76	50
September	90	35	72	32
October	69	11	61	9

STILLWATER, 1877 AND 1878.

November	68	9	60	7
December	54	15	52	13
January	37	— 8	35	— 9
February	54	10	47	9
March	63	27	56	25
April	72	28	63	25
May	77	37	66	34
June	85	55	72	51
July	93	64	81	59
August	88	60	78	52
September	89	40	73	35
October	79	24	66	17

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BRECKENRIDGE, 1877 AND 1878.

	Highest. Temperature.	Lowest. Temperature.	Highest. Humidity.	Lowest. Humidity.
November	53	— 4	—	—
December	49	—10	—	—
January	38	—21	—	—
February	53	— 2	—	—
March	72	19	—	—
April	74	25	—	—
May	78	29	—	—
June	89	42	—	—
July	97	49	—	—
August	90	41	—	—
September	96	17	—	—
October	79	12	—	—

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TABULAR VIEW OF MEANS.

	1877. NOVEMB.		1877. DECEMB.		1878, JANU'RY		1878. FEBRU'Y.		1878. MARCH.		1878. APRIL.		1878, MAY.		1878. JUNE.		1878. JULY.		1878. AUGUST.		1878. SEPT.		1878. OCTOBER.			
	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Annual Mean Temperature.	Annual Mean Humidity.
St. Cloud.....	29.31	66.41	31.76	68.07	20.62	69.00	30.07	68.57	40.77	67.90	45.31	68.29	52.24	71.15	65.40	80.54	72 56	76.41	70.96	73 41	58.99	70.98	44.80	67.98	46.90	70.72
St. Paul.....	32.40	74.40	.....	.....	22.50	79.70	31.60	72.00	44.40	65.60	51.10	58.20	55.10	56.70	66.60	69.00	73.70	72.90	72.00	68.30	60.60	67.40	46.30	62.30	56.93	67.86
Duluth.....	32.80	77.90	34.10	78.80	22.20	76.90	31.80	75.60	39.40	71.50	44.30	70.80	49.50	64.70	60.20	72.30	70.80	69.80	70.50	64.10	57.30	73.80	42.80	70.80	46.30	72 25
Minneapolis....	30.37	43.89	31.55	84.40	19.39	78.90	29.68	78.50	43.60	68.00	50.18	66.50	53.09	64.00	64.23	71.60	72.23	77.10	70.45	73.60	59.27	73.90	44.10	70.50	47.34	70 90
	28	days	25	days	26 days	23 days	25	days	6	days	23	days	13	days	23	days	28	days	22	days	23	days				
Winona.....	30.56	64.60	33.37	67.30	24.10	57.26	33.06	60.50	40.51	81.66	52.69	57.66	57.16	85.43	69.16	66.42	72.15	69.76	72.99	65.98	60.50	72.96	.....	.....	49.65	68.13
St. Peter.....	27.19	74.92	36.32	81.97	22.37	80.65	31.92	72.92	45.19	71.17	30.42	72.43	54.30	68.38	66.43	78.45	74.52	79.16	71.33	75.43	57.80	74.73	45.01	69.46	46.90	74.63
Owatonna.....	28.81	66.20	29.80	70.61	20.23	61.98	29.67	64.86	32.61	66.76	47.95	58 05	52.61	60.63	63.84	69.82	71.53	73.79	65.63	68.04	57.84	70.36	44.10	61.57	45.38	66.05
Stillwater.....	33.88	72.96	34.97	80.78	25.08	70.69	33.45	73.63	46.67	64.27	52.42	59.39	55.39	58.60	66.65	68.04	74.46	69.63	72.52	68.40	61.28	65.37	48.20	57.33	50.41	67.42
Breckenridge...	27.00	81.80	28.30	87.90	14.70	84.70	27.40	85.50	39.20	76.30	47.60	71.00	51.20	69.20	64.90	75.20	70.70	74.70	68.70	75.30	54.70	74.40	39.90	69.00	44.46	70.41
Average of the Month. means.	30.25	69.23	32.52	77.47	21.24	73.30	30.91	72.45	41.37	70.35	46.88	64.70	53.39	66.53	65.26	72.37	71.40	73.69	70.56	70.28	58.69	71.54	48.80	66.11	.....	.....

1875 and 1876. { Annual mean temperature..42.50 / Annual mean humidity.....68.06

1876 and 1877. { Annual mean temperature..43.73 / Annual mean humidity.....66.67

1877 and 1878. { Annual mean temperature..48.25 / Annual mean humidity.....69.61

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THE RELATIONS OF SCHOLASTIC METHODS

TO THE

HEALTH OF PUPILS

IN THE

PUBLIC SCHOOLS.

THE SECOND REPORT.

BY THE SECRETARY.

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HEALTH OF PUPILS IN THE PUBLIC SCHOOLS.

BY THE SECRETARY OF THE BOARD.

In continuation of the investigation begun in 1877, of which the result was given in this report last year, the following is respectfully submitted:

A blank was prepared and a health register has been provided by the regents of the University in which all the data are recorded for every student for each year of attendance. It is hoped that the same method will be taken in other institutions, to collect and preserve the data. The greatest difficulty in such work as this is getting all the data with accuracy. It was thought best, therefore, to confine the work for 1878 to the University, to Carleton College, to one high school, and one normal school. Prof. Sperry has been unable to furnish the record for Carleton in time for this report. The writer made the record at the University and at the Red Wing High School. The record for the Normal School at Winona was in part, at least, made by the pupils themselves, and is not so accurate as it will in the future be made.

The experience in these examinations had already by the writer, will enable him to make a much larger collection of facts during 1879. The work has the cordial support and co-operation of the teachers of the State, and has awakened an interest among the pupils of the schools in matters of hygiene which could not have been so well secured in any other way.

The medical profession and parents of scholars are interested because the opinion is gaining ground that there is something injurious to health, especially that of girls, in our present methods of school management. This opinion has found expression in various ways according to the personal belief of individuals. All admit, however, that sufficient facts are wanting for a well grounded judgment in the matter. The present inquiry has for one of its objects the collection of those facts. But another and leading end in view in our higher schools, at least, is to know, and to assist each student to know, the facts of his or her physical condition as respects health.

In matters of health, as of business, a great point is gained when the individual takes careful "account of stock" and finds out what is lacking to make one's health what it ought to be. That known, it is easy to teach practical hygiene, and to offer the strongest inducements to efforts at a nearer approach to the normal standard of one's age and sex.

Students, especially those who are making great sacrifices for intellectual culture, need this lesson, and in the university, colleges and high schools, the majority are of this class. Much assistance is expected from medical men. Their professional training best fits them for it, and their aid will be asked with confi-

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dence. The thanks of the writer are due to the regents and faculty of the University for their support and assistance in his work there. Time will show that very great good will be accomplished in directing and assisting students to better knowledge and use of their physical organization than at present. The example of Amherst College in this direction, is well worthy of imitation. Surgeon Gihon, U. S. N., has kindly furnished the physical data of the students of the Naval School at Annapolis. Upon application it is found that no records have been kept at West Point, though a rigid physical examination is said to be a prerequisite to admission there.

Many data from other sources have been collected, of which the summary is herewith presented.

No statistics are here given of the defects of vision, though the record has been made. It is not yet complete, and is reserved for the succeeding report.

This much may be said: There is even more complaint of pain in the eye-ball and eye-brow. In most cases this is due to an excessive strain of the muscles of accommodation, i. e., those muscles which adapt the eye to the sight of small objects near at hand; as of type, in reading. The difficulty is increased by defective light and improper positions, as also by improper type. It is in the power of teachers to do much to relieve this abuse of eyesight by simply compelling a frequent change of vision to different and more distant objects; as maps, blackboard and other exercises.

The majority affected in this way are near-sighted (myopic) or have eyes with different foci. The effect of this latter difficulty is that one eye is compelled to do the work, and the other is fatigued in the fruitless effort to assist. This subject will be carefully studied during 1879. It is attracting much attention in the eastern schools, and very valuable statistics are being collected with reference to its cause and prevention.

It is proper to state the method pursued in collecting the health data at the University. I submit the blank in use. This is printed upon slips, one of which is filled for each student, and afterwards copied upon the permanent record.

The apparatus necessary are—

Scales.

A measure for height, divided into fractions of an inch.

A spirometer. The gas meter pattern is the one used at the University, Carleton College and the Naval School at Annapolis.

A series of Snellin's text type.

A tape measure.

Each student is examined separately, and each fact recorded as observed. In all cases of doubt repeat the observation.

The following is the blank:

Date of examination.

Name. (Written by the student,)

Age. (At nearest birthday.)

Nativity. (Give the name of the State or country where born.)

Nativity of father. (Give the name of State or country where born.)

Nativity of mother. " " " "

Complexion.

Hair, color of.

Eyes, "

Vaccinated, when successful.

Height, in inches.

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Weight, in pounds.

Arm girth around largest part.

Forearm " "

Waist girth, maximum at complete inspiration. Minimum at complete expiration.

Chest measure, maximum at complete inspiration. Minimum at complete expiration. (This measurement is, in males, taken under the vest; in females, over the dress.)

Chest capacity. (After as full inspiration, as possible as complete expiration into the spirometer; then read off the record in cubic inches.)

Arm lift, right. } (Not yet recorded; its value and the best method of testing,
" left. } is under consideration.)

Sight; left and right eye separately. (The student standing; the type hanging on wall, at height of eye, opposite the light; type read at ten and twenty feet, and in case of marked defect at other distances.)

Color sight. (Tested by colored cards or skeins of woolen yarn of the primitive colors, and some of the shades. The student to match the card or wool offered, from the pile before him.)

Hearing. (For each ear, by watch at arm's length; one ear at a time.)

Eruptive diseases; small-pox, measles, scarlatina, chicken-pox, etc.

Remarks. (Note any other facts bearing upon health, especially predisposition and diseases.)

This form, if carefully filled, affords as complete a record of physical condition as is possible under the circumstances. The observer, if a physician, will, while making it, get a fair basis for an estimate of the students' health, and the average of the record is the nearest approach to a "physical constant." The value of the average depending upon the number of accurate observations from which it is derived.

Table number one gives these data for 1877 and 1878, averaged for each institution. By the data for 1877, the average age of males in the University and Carleton College is 20.31 years; of females, 19.95 years. The average age of males at the University is nearly one year greater than at Carleton college, and of females nearly one year and a half greater.

The average age of students at the Winona and St. Cloud Normal schools is of males, over 19 years, of females, 17.14 years. The average age of pupils in the high schools is, of males, 16.27 years; of females, 16.24 years.

Table number two gives the nativities of the students in the University for 1878, with the percentage of each class; 94.50 per cent. were born in the United States. Of the whole number 46.96 per cent. were born in Minnesota, and 47.54 per cent. in 15 other States of the union.

But fourteen were born out of the United States; 7 or 2.73 per cent. in British America; 7 or 2.73 per cent in foreign countries.

By parent nativity: 70.81 per cent. have American parents; 22.57 per cent. have foreign parents; 5.06 per cent. have one parent foreign.

In table number three the physical data of the males are averaged by nativity and parent nativity, for comparison, and the maxima and minima measurements are given in the same way.

These data, when sufficient observations have been received, will go far to answer questions as to the physical deterioration of young Americans; of the influence of change of climate, etc., upon the children born abroad, and of the comparative physical vigor of children of American, foreign or mixed parentage, all

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questions of importance as bearing upon the future of our population in this State and country.

Table four is the first attempt to compare the average of physical data and maxima and minima measurements, of an eastern and western college—Amherst compared with the University of the State.

The most marked difference is in the minimum of weight, chest expansion, and (if the measurements are taken in the same way,) the superiority of the Amherst students may probably be attributed chiefly to systematic gymnastic exercise, and also in part to increased age, a difference of nearly two years in the Amherst students.

Table number five gives the average of physical data for the female students at the University, with the maxima and minima measurements for the same for 1878.

A reference to table one will show the average for 1877 of the young ladies at the University, Carleton College, at two normal schools and some high schools.

Table number six gives the data at the University for 1878, averaged with reference to nativity, parent nativity and weight, and affords many interesting comparisons.

Table seven is made up from preceding tables, from those presented by Surgeon Gihon of the Navy, and from the report of the Provost Marshal General, U. S. A. It includes, therefore, students at school, students who were drafted, and soldiers of nearly all nationalities who served in the late war, and the average of colored soldiers.

The army statistics place Minnesota third in order of superiority of height of her soldiers among the States of the union, Kentucky coming first and Kansas second.

During the year 1879 it is proposed to secure as many school data in our own State and in others as possible, and to obtain the same data for other bodies of men and women in all classes of our population, for comparison. Especial attention will be paid to the study of defective vision, as affected by scholastic methods, and to the influence of the existing methods of lighting, heating, ventilating and seating school rooms. Many defects in these particulars are already recognized, but the best methods of preventing or removing them are still unsettled.

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TABLE NO. 1—Physical Data of Students averaged by School and Sex, for 1877 and 1878.

NAME OF INSTITUTION.	Age, in years.		Height, in inches.		Weight, in pounds.		CHEST MEASURE. Maxim'm		CHEST MEASURE. Minimum		Mean girth of chest.		Chest expansion.		Chest capacity in inches.		Students' nativity, American.		Students' nativity other than American.		Students with one parent foreign.		Parents' nativity, American.		Parent nativity other than American.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
University of Minnesota, 1877....	20.79	20.60	69.36	64.56	144.55	120.34	36.19	32.54	32.91	29.41	34 55	30.97	3.28	3.13	.....	.....	81	24	4	....	...	...	66	22	20	2
Carleton College, "	19.84	18.13	67.20	63.12	148	133	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	...	....	....	...	...	...	...	...	...
Winona Normal, "	19.20	17.61	67.32	63.72	141.25	127.76	36.80	34.32	33.85	31.88	35.32	33.10	2.95	2.44	.....	.....	28	58	13	37	...	...	...	...	...	...
St. Cloud Normal, "	18.69	16.68	67.56	62.88	142.57	119.33	35.81	33.30	.....	.....	.....	.....	.....	.....	.....	.....	21	69	4	....	...	...	14	58	14	11
St. Paul High School, "	15.94	16.22	65.04	63.00	.....	.....	34.35	33.34	32.52	31.82	33 43	32.58	1.83	1.52	.....	.....	...	...	....	....	...	...	...	...	...	...
Winona High School, "	17	16.50	66 72	63.60	133 50	114.00	34.41	32.61	31.68	31.14	33.04	31.87	2.73	1.47	.....	.....	32	54	....	1	...	...	...	...	...	...
Red Wing High School, "	15.85	16.02	64.44	62.04	117.51	113.79	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	39	4	2	...	...	26	28	14	15
Deaf and Dumb Asylum, "	16.20	15.56	63.20	60.60	120.72	109.36	30.83	28.83	.....	.....	.....	.....	.....	...	.....	.....	13	17	4	7	...	...	7	7	10	17
University of Minnesota, 1878....	20.72	21.53	67.87	64.99	140.94	124.57	34.62	32.92	30.78	29.10	32.70	31.01	3.84	3.82	243.18	168.82	149	91	13	2	5	8	109	73	46	12
Winona Normal, "	19.56	18.33	68.08	63.36	149.22	124.71	34.41	33.73	30.97	31.37	32.69	32.55	3.44	2.36	.....	.....	28	86	4	5	...	...	22	51	10	40
Red Wing High School, "	15.50	17.24	64.10	64.35	117.57	119.92	30.96	32.58	28 32	29.00	29.64	30.85	2.64	3 26	.....	.....	12	21	2	3	1	3	10	10	3	11

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TABLE NO. 2—University of Minnesota. Table of Nativities and Parent Nativities with per cent. of each class.

	No.	Total.	Per cent of totals.
Students born in Minnesota	120		46.69
" " " Wisconsin	24		9.34
" " " New York	17		6.61
" " " Vermont	10		3.89
" " " Ohio	10		3.89
" " " Maine	10		3.89
" " " Indiana	8		3.11
" " " Pennsylvania	7		2 73
" " " Illinois	7		2.73
" " " Michigan	5		1.95
" " " Iowa	5		1.95
" " " Massachusetts	4		1.55
" " " California	2		
" " " Connecticut	2		
" " " Kentucky	1		6.21
" " " Delaware	1		
" " " United States but State not reported	10		
" " " United States		243	94.54
" " " British America		7	2.73
" " " Foreign countries		7	2.73
Students of American parentage	182		70.81
" " Foreign "	58		22.57
" with one parent foreign	13		5.06
" Parent nativity not reported	4		1.56
		257	100.00

TABLE NO. 3—University of Minnesota. Table of Physical data by Nativity and Parent Nativity with Maximum and Minimum Measurements for the male students.

		Number.	Age.	Height.	Weight.	Mean girth of chest.	Chest expansion.	Chest capacity.
Minnesota Nativity and Parentage	American	56	19	68.52	141.12	32.32	3.99	241.34
" " " "	Foreign	22	18.95	67.75	143 50	33.33	3.89	252.33
American " " "	American	53	20.45	68.75	145.25	33.17	3.96	256.50
" " " "	Foreign	18	21	69.69	156.50	34.34	4.06	265.80
Foreign " " "	"	13	20.92	68.51	143.00	33.13	3.96	241.00
Minnesota Nativity Parents American	Max.	..	24	73.75	173	37.00	5.00	320.00
	Min.	..	14	63 00	101	27.25	2.50	150.00
" " " Foreign	Max.	..	23	73.00	170	36.75	5.00	325.00
	Min.	..	14	61.00	97	29.51	2.00	170.00
American " " American	Max.	..	30	74.51	189	38.00	6.51	365.00
	Min.	..	15	63.00	101	27.75	2.00	150.00
" " " Foreign	Max.	..	24	74 25	220	36.50	5.00	375.00
	Min.	..	15	66.25	134	31.00	3.00	150.00
Foreign " " "	Max.	..	28	72.50	165	36.00	5.00	320.00
	Min.	..	15	61.00	95	27.51	2.50	125.00

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TABLE IV.—*Showing average Maxima and Minima Measurement at the University and Amherst College for 1878.*

		Number.	Age.	Height.	Weight.	Mean girth of chest.	Chest expansion.	Chest capacity.
University of Minnesota average for 1878		152	20.72	67.87	140 94	32.70	3.84	243.18
Males.	Maxima	....	28	74.50	220.00	38 50	6.50	375.00
	Minima	....	14	61.00	95.00	27.75	2.00	125.00
Amherst College average for 1878		332	20 98	66.20	141 22	35.15	3.23	244.43
Males.	Maxima	....	27.66	75.12	192.00	42.00	6.67	361.00
	Minima	....	15.90	61.92	95.00	30.62	4.39	130.00

TABLE NO. 5—Mean Average and Maxima and Minima of the Females in University of Minnesota for 1878.

		Number.	Age.	Height.	Weight.	Mean girth of chest.	Chest expansion.	Chest capacity.
Mean Average		81	21.53	64.99	124.57	31.01	3.82	168.82
Females	Maxima	....	31	70.50	155.00	33.75	5.50	285.00
	Minima	....	14	58.00	96.00	24 75	2.00	100.00

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TABLE NO. 6—UNIVERSITY OF MINNESOTA.

(MALES.)

Students of Minnesota Nativity and American Parentage.

HEIGHT.	Number.	Age.	Weight.	Mean chest girth.	Chest expansion.	Chest capacity.
5 ft. 3 in. @ 5 ft. 4 in.....	1	16	102	28.125	3.75	175
5 ft. 4 in. @ 5 ft. 5 in.....	2	15	110.50	29.615	3.25	170
5 ft. 5 in. @ 5 ft. 6 in.....	2	21	140	32.615	4.25	257.50
5 ft. 6 in. @ 5 ft. 7 in..... ...	5	18.20	128.40	31.30	3.60	212
5 ft. 7 in. @ 5 ft. 8 in.....	6	18.666	134.333	31.750	3.833	246.666
5 ft. 8 in. @ 5 ft. 9 in.....	11	20.181	144.090	33.150	3.75	248.636
5 ft. 9 in. @ 5 ft. 10 in.....	7	18.428	147.856	32.084	4.089	255.714
5 ft. 10 in. @ 5 ft. 11 in.....	6	18.666	147.666	33.312	4.125	280
6 ft. @ 6 ft. 1 in.....	6	19.833	162.166	34.041	4.333	281.666
6 ft. 1 in. @ 6 ft. 2 in.....	1	18	165	34	5	.....

Students of Minnesota Nativity and Foreign Parentage.

5 ft. 1 in. @ 5 ft. 2 in.....	1	14	97	29.500	3	170
5 ft. 2 in. @ 5 ft. 3 in.....	1	17	126	32	4	200
5 ft. 3 in. @ 5 ft. 4 in.....						
5 ft. 4 in. @ 5 ft. 5 in.....	1	17	112	30	4	170
5 ft. 5 in. @ 5 ft. 6 in.....	1	18	157	35.625	4.250	240
5 ft. 6 in. @ 5 ft. 7 in..... ...	3	20.333	140.50	33.500	3.666	213.50
5 ft. 7 in. @ 5 ft. 8 in.....	1	23	143	32	4	275
5 ft. 8 in. @ 5 ft. 9 in.....	3	20.666	146	33.880	3.833	246.666
5 ft. 9 in. @ 5 ft. 10 in.....	2	20.50	146	33.625	4.25	260
5 ft. 10 in. @ 5 ft. 11 in.....	3	18.333	147	32.880	4.166	253.333
6 ft. @ 6 ft. 1 in..	1	23	145	34	4	325
6 ft. 1 in. @ 6 ft. 2 in.....	1	20	156	34.250	3.500	260

Students of American Nativity and American Parentage.

5 ft. 3 in. @ 5 ft. 4 in.....	1	16	104	27.750	2.50	180
5 ft. 4 in. @ 5 ft. 5 in.....	2	17.50	169.50	30.360	3.75	192.50
5 ft. 5 in. @ 5 ft. 6 in.....	3	19	152.666	30.333	3.333	218.333
5 ft. 6 in. @ 5 ft. 7 in.....	4	17.50	126.50	31.25	4.25	245
5 ft. 7 in. @ 5 ft. 8 in.....	12	21.50	144.250	33.259	3.666	234.560
5 ft. 8 in. @ 5 ft. 9 in.....	5	22.200	140.600	32.150	4.500	238
5 ft. 9 in. @ 5 ft. 10 in.....	6	21.666	147.166	33.625	4.332	266.666
5 ft. 10 in. @ 5 ft. 11 in.....	9	20.444	154.666	34.166	4.111	283.333
5 ft. 11 in. @ 6 ft.	7	20.428	153.428	33.142	4.607	285
6 ft. @ 6 ft. 1 in.....	1	30	163	35.500	4	240
6 ft. 1 in. @ 6 ft. 2 in.....	2	21	182	35.875	3.75	317.50
6 ft. 2 in. @ 6 ft. 3 in.....	2	19.50	173.50	35.875	4.25	337.50

Students of American Nativity and Foreign Parentage.

5 ft. 6 in. @ 5 ft. 7 in.....	3	21.333	140.666	35.333	4	285
5 ft. 7 in. @ 5 ft. 8 in.....	1	17	152	33.75	4.50	265
5 ft. 8 in. @ 5 ft. 9 in.....	4	22.50	144.25	34.125	3.75	221.25
5 ft. 9 in. @ 5 ft. 10 in.....	2	17.50	148.50	33.375	4.25	270
5 ft. 10 in. @ 5 ft. 11 in.....	2	23	156	33.75	4	285
6 ft. @ 6 ft. 1 in.....	4	21.50	130.50	35.437	4.375	303.75
6 ft. 1 in. @ 6 ft. 2 in.....	0	0	0	0	0	0
6 ft. 2 in. @ 6 ft. 3 in..... ...	1	23	168	35.75	4	300

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TABLE NO. 6—UNIVERSITY OF MINNESOTA.—Continued.

(MALES.)

Students of Foreign Nativity and Parentage.

HEIGHT.	Number.	Age.	Weight.	Mean chest girth.	Chest expansion.	Chest capacity.
5 ft. 1 in. @ 5 ft. 3 in.	1	15	95	27.50	3	125
5 ft. 3 in. @ 5 ft. 6 in.	1	28	132	33	4	210
5 ft. 6 in. @ 5 ft. 7 in.	2	21	142.59	34	5	215
5 ft. 7 in. @ 5 ft. 8 in.	1	17	141	31.250	2.50	215
5 ft. 8 in. @ 5 ft, 9 in.	1	17	145	33.50	5	260
5 ft. 9 in. @ 5 ft 10 in.	1	23	154	36	4	320
5 ft. 10 in. @ 5 ft. 11 in.	3	23.666	156.666	34.333	3.666	253.333
5 ft. 11 in. @ 6 ft.	1	20	142	32.25	3.50	290
6 ft. @ 6 ft. 1 in.	2	19.50	145	32.625	4.25	270

Students whose Father is Foreign and Mother American.

5 ft. 9½ in.	1	19	135	32.50	4	260
5 ft. 11 in.	1	22	170	35.50	5	325

Students whose Father is American and Mother Foreign.

5 ft. 8¼ in	1	19	146	33	4	300
5 ft. 10 in.	1	18	167	35.75	3	250
5 ft. 11 in.	1	17	145	35	2	260

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Physical data of Minnesota Students compared with those of U. S. Naval Academy, Amherst College and U. S. Army.

		Number Examined.	Superiority of Height.	Age.	Mean Height.	Mean Weight.	Mean Girth of Chest.	Chest Expansion.	Chest Capacity.
University of Minnesota.	Males.	4	....	14	64.56	108.00	29.50	3.25	191.25
		6	....	15	65.95	121.33	29.91	3.83	208.33
		9	....	16	66.11	120.11	29.98	3.36	200.00
		9	....	17	67.75	137.75	31.61	3.99	231.11
		19	....	18	69.06	146.53	32.60	4.00	259.11
		25	....	19	68.66	146.68	32.91	3.97	248.62
		26	....	20	69.00	146.61	33.05	4.01	252.60
		18	....	21	69.07	153.88	33 46	4.21	280.83
		12	....	22	68.54	147.83	33.87	3.96	289.58
		14	...	23	70.27	159.93	34.50	4.14	277.30
		7	....	24	68.68	150.43	34.43	4.00	255.71
		1	....	25	68.25	142.00	33.50	3.00	250.00
		1	....	26	70.75	160.00	35.50	4.00	270.00
		1	....	28	63.50	132.00	33.00	4.00	210.00
University Average for 1878.		152	....	20.72	67.87	140.94	32.70	3.84	243.18
a. University Av'ge for 1877.		.....	....	20.79	67.80	144.55	32.91	.....	.....
a. Carleton College, 1877..		.....	....	19.84	66.00	148.00	.....	.....	.....
a. Winona Normal, 1877.....		.....	....	19.20	66.10	141.25	33.85	.....	.....
a. St. Cloud Normal, 1877.....		.....	...	18.69	66.30	142.51	.....	.....	.....
a. St. Paul High School, 1877.		.....	....	15.94	64.20	.....	32.52	.....	.....
a. Winona High School, 1877..		.....	....	17.00	65.60	133.50	31.68	.....	.....
a. Redwing High School, 1877		.....	....	15.85	63.70	117.57	.....	.....	.....
a. Deaf & Dumb Asylum, 1877		.....	....	16.20	62.70	120.72	.....	....	.....
b. Amherst College—Students from 1861 to 1869.....		.....	Mean age.	24.72	67.81	139.49	36.14	.....	.....
Naval Academy at Annapolis.		29	....	13 @14	58.70	83.47	27.88	2.50	... .
		94	....	14½	61.12	94.18	28.47	2.38	.....
		167	...	14½@15	61.57	95.79	28.45	2.31	.....
		220	....	15½	63.21	102.35	30.00	2.37	.....
		327	....	15½@16	64.14	108.38	30.37	2.42	.....
		390	....	16½	65.21	112.57	30.77	2.52	.....
		539	....	16½@17	65.44	117.09	31.70	2.52	.....
Average.....		.....	....	15.43	63.23	101.98	29.66	2.43	.....
c. Students		167	....	21.84	67.73	.....	33 76	.....	.....
Kentucky.....		.....	1	.....	.....	.....	.....	.....	.....
Kansas		.....	2	.....	.....	.....	.....	.....	.....
d. Minnesota.....		3,682	3	18.45	68.371	.....	34.020	2.792	.....
e. Americans.....		6,359	....	26.387	67.297	136.057	32.491	3.242	.....
e. British Americans.....		589	....	24.935	67.059	138.693	32.666	3.272	.....
f. Englishmen.....		454	....	27.355	66.348	135.639	32.749	3.187	.....
f. Irishmen.....		1,447	....	26.796	66.589	136.464	33.119	3.206	.....
f. Germans.....		1,343	....	30.101	65.982	136.478	33.047	3.231	.....
g. Colored men of U. S.....		377	....	26.948	66.387	141.671	32.844	3.232	.....

a. Sixth Annual Report State Board of Health of Minnesota, p. 102.
b. Medical Statistics, Provo Marshal General's Report, Vol. I, p 57.
c. Medical Statistics, Provo Marshal General's Report, Vol. I, p. 31.
d. Medical Statistics, Provo Marshal General's Report, Vol. I, pp. 25, 32, 45.
e. Medical Statistics, Provo Marshal General's Report, Vol. II, p, 15.
f. Medical Statistics, Provo Marshal General's Report, Vol. II, p. 16.
g. Medical Statistics, Provo Marshal General's Report, Vol, II, p. 15.

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FINANCIAL STATEMENT.

1878.				
January 1.	Balance in bank		$7 85	
" 26.	Rec'd from State Treasurer cash for bal. of expenses for 1877, from appropriation for 1877		159 55	
1879.				
January 1.	Rec'd of State Treasurer salary of Sec'y for '78		500 00	
Febr'y 6.	Rec'd of State Treasurer expenses of Board for 1878, from appropriation for 1878		638 66	
April 1.	Total to be accounted for up to date	$1,306 06		
	Expenses of Secretary's office			$41 67
	Dr. E. J. Davis, traveling and other expenses			33 90
	Johnson, Smith & Harrison, for printing			23 50
	Dr. C. H. Boardman, for services			25 00
	Dr. F. Atwood, for services			10 00
	Prof. S. F. Peckham, chemical analyses			114 95
	Traveling expenses of Secretary			24 65
	Dr. W. H. Leonard, traveling and com. exp'ses			11 00
	Dr. F. Staples, traveling and com'tee expenses			50 00
	Dr. D. W. Hand, delegate to Yellow Fever Conference, Richmond, Va			114 35
	Dr. C. N. Hewitt, delegate to Yellow Fever Conference, Richmond, Va			101 50
	Exchange on drafts			90
	Dr. I. N. Danforth, microscopic work and engraving			20 15
	Books for library of the Board			36 55
	John W. Moore, for clerical work in office			25 00
	Total expenses of Board for 1878			$633 12
	Salary of Secretary for 1878			500 00
April 1.	Balance for 1878 unexpended, in bank	$173 14		
	The appropriation for 1878, was			$1,500 00
	From which has been paid—			
	For expenses of Board	$638 66		
	For Secretary's salary	500 00		
	Balance of appropriation not used			$361 34

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INDEX.

	Page.
Academy, Naval at Annapolis, physical data of cadets at	125
Age, average of pupils in University and other schools	118
Albert Lea, Diphtheria in	44
Amherst College, physical data of students at	122–125
Analysis, chemical of waters	86
" chemical of Mississippi river water	89
" chemical of Minneapolis water supply	89
" chemical of suspected waters from Mankato	86
Bacteria, if present in diphtheritic exudations, accidental	56
" varieties of in diphtheritic exudations	54
Barber, Dr. R. D.—Report on Diphtheria in Worthington	44
Berry, Dr. Chas.—Report on Diphtheria in New Ulm	43
Blood, Solomon, M. D., Meteorology of Owatonna, by	111
Boardman, Dr. C. H.—Report on Diphtheria in St. Paul	34
" " " —Report on Microscopic Examinations of diphtheritic exudations	54
Bowers, Dr. J. E., Meteorology of St. Peter, by	110
Breckenridge, Meteorology of	112
" table of temperature and humidity by months	112
Brownsville, topography of	45
" Diphtheria in	45
Carleton College, physical data of students for 1877	120–125
Cheney, Wm. Esq.—Meteorology of Minneapolis, by	111
Colleges, Eastern and Western, physical data of, compared	122
Collins, Dr. D. B.—Report on Diphtheria in St. Peter	43
Contents, table of	5
Coon, Dr. H. L.—Report on Diphtheria in and around Northfield	41
Cross, Dr. E. C.—Report on Diphtheria around Rochester	39
Croup, Statictics of in Minnesota	58
Danforth, Dr. I. N., found no Micrococci in exudations	56
Daniels, Dr. A. W.—Report on Diphtheria in St. Peter	72
Davis, E. J., M. D.—Report on Vaccination	24
" " " —Report on Diphtheria	67
" " " —Report on Small Pox in Blue Earth county	17
Davenport, James, M. D.—Report on Small Pox at Fisher's Landing	18

Digitized by Google

		Page.
Diphtheria,	action of Board respecting	10
"	a disease of debility	60
"	as affected by internal or constitutional conditions—opinions of correspondents on	48
"	as influenced by external conditions—opinions of correspondents on	46
"	cause and pathology of—opinions of correspondents on	49
"	circular concerning, by committee of State Board of Health	30
"	directions of Massachusetts Board of Health, respecting	66
"	evidence of infectious character of	69
"	general description of	52
"	general history of	28
"	hygienic and medical treatment of—report on	60
"	history of, in Minnesota	32
"	is a contagious disease	64
"	its cause a specific poison	60
"	in Albert Lea	44
"	in Brownsville	45
"	in Dodge Center	40
"	in Eyota	38
"	in Faribault	40
"	in Hastings	35
"	in Lake City	35
"	in Lewiston	38
"	in Mankato	42–67
"	in Mankato, 1878	67
"	in Minneapolis	33
"	in Minneiska	36
"	in Minnesota City	37
"	in New Ulm	43
"	in Northfield	41
"	in Owatonna	40
"	in Red Wing and Goodhue county—report on	80
"	in Rochester and vicinity	39
"	in Rushford	45
"	in Spring Valley	44
"	in St. Charles	38
"	in St. Cloud	32
"	in St. Paul and Ramsey county	34–74
"	in St. Peter and vicinity	42–72
"	in Stillwater	34
"	in Wabasha	35
"	in Waseca	41
"	in Winona	37
"	in Worthington	44
"	made virulent and fatal by impure drinking water	91
"	may originate spontaneously	62
"	means of preventing the spread of	59
"	microscopic examinations of exudations	54, 55
"	outline of general history of	28

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Page.
Diphtheria, oyster-like variety of exudation.... 53
" origin of in Mankato.... 67
" prevention and remedies.... 71
" report on by Dr. Franklin Staples.... 28
" reports on, fatality and results of, in Minnesota.... 56
" results and sequelæ.... 70
" resume of the study of in Minnesota.... 62
" statistics of in Ramsey county.... 78
" statistics of in Red Wing.... 81
" statistics of deaths from in Minnesota.... 57
" statistics of in Minnesota.... 57
" summary of observations upon.... 62
" summary of statistics of.... 45
Diphtheritic Exudations, microscopic appearances of.... 54, 55
" " Bacteria and other low organisms accidental in.. 56
Dodge Centre, topography of.... 40
" " Diphtheria in.... 40
Doors of public halls should open outward.... 13
Duluth, table of temperature and humidity by months.... 111
" report respecting Diphtheria in.... 32
" meteorology of.... 111
Dust Fires and Explosions, report on.... 94
" " cause and prevention of.... 94
" " 99 per cent. originate from unprotected lights.. 94
" " a lantern to prevent.... 95
Evarts, Dr. T. H., Diphtheria in Rushford.... 45
Explosions from Dust Fires caused by unprotected lights.... 94
Eyota, Diphtheria in.... 40
Erysipelas, statistics of in Minnesota.... 58
Faribault and vicinity, Diphtheria in.... 40
Financial Statement.... 126
Finch, Dr. J. E.—Report on Diphtheria in Hastings.... 35
Fisher's Landing, Small Pox at, report on.... 18
Gihon, Surgeon, U. S. N., furnishes physical data of Naval Academy at Annapolis.... 117
Goodnow, Mr. John, analysis of Mississippi river water.... 92
Grand Forks, D. T., Small Pox at, report on.... 20
Guthrie, Dr. H. H.—Report on Diphtheria in St. Charles.... 38
Hamilton, Dr. M. H.—Report on Diphtheria in Minneiska.... 36
Hand, Dr. D. W.—Report on Diphtheria in St. Paul.... 34
" " delegate of Board to Yellow Fever Conf. at Richmond. 12–102
" " —Report on Yellow Fever.... 98
Harrington, Dr. Z. G.—Report on Diphtheria in Mankato.... 42
Hastings, Diphtheria in.... 35
Health of pupils in public schools, report on.... 116
Health Record, form for taking.... 117
Hewitt, Dr. C. N.—Report on health of pupils in public schools.... 116
" " delegate of Board to Yellow Fever Conf. at Richmond.. 12–102
Hunt, Dr. M. V.—Report on Diphtheria in Waseca and vicinity.... 41

Digitized by Google

	Page.
Imbecile Children, duty of State to care for	13
" " should be sent to the institution for Deaf and Dumb	13
" " school for recommended	13
Insane, Hospital for, crowded	31
Lake City, Diphtheria in	35
" " topography of	35
Lantern; a safety, for use in mills	94
Leonard, Dr. W. H.—Report on meteorology	108
LeBlonde, Dr. J. B.—Diphtheria in Brownsville	45
Lewiston, Diphtheria in	38
" topography of	38
Lincoln, Dr. W. L.—Diphtheria in Wabasha	36
Mankato, Diphtheria in	67–42
" samples of well water grouped according to impurities	90
" Small Pox at	17
" well water, chemical analysis of	86
Marlatt, S., Esq.—Meteorology of St. Cloud by	110
DcDonald, Dr. A.—Report of Diphtheria in St. Cloud	32
Measles, statistics of in Minnesota	58
Members of State Board of Health, names and places of residence	7
Meteorological Observers of Board, names and stations of	108
Meteorology of State, action of Board respecting	13
Micrococci found in diphtheritic exudations	54
" not usually present in diphtheritic exudations	56
Microscopic examinations of diphtheritic exudations	54, 55
Milligan, Dr. F. H.—Report on Diphtheria in Wabasha	35
Minneapolis; chemical analysis of water used in	89–92
" Diphtheria in	33
" meteorology of	110
" table of temperature and humitity by months	110
" water supply and sewage of	11
Minneiska, topography of	36
" Diphtheria in	36
Minnesota City, topography of	37
" " Diphtheria in	37
Minnesota, comparison of average precipitation in, with other States	109
" comparison of average temperature in, with other States	109
" meteorology of, 1878, report on	108
" physical data of students by school and sex	120
" ranks third in order of superiority of height of soldiers	119
" statistics of Croup in	58
" statistics of Diphtheria in	57–58
" statistics of Erysipelas in	58
" statistics of Scarlatina in	58
" statistics of Typhoid Fever in	58
" statistics of Measles in	58
" statistics of Whooping Cough in	58
" statistics of zymotic diseases in	57, 58
" tabular view of annual means of temperature and humidity	113
" tabular view of monthly means of temperature and humidity by stations	113

Digitized by Google

Page.
Minnesota, tabular view of seasons by stations.... 109
" University of, physical data of students in.....120–125
" " " nativities and parent nativities of students in.. 121
" " " physical data, by nativities and parent nativities of male students..... 121
" " " comparison of physical data with Amherst Coll.. 122
" " " physical data of female students in..... 120
" " " physical data of students in, by nativity and parentage..... 123–124
Mississippi river, analysis of water from.....89–92
Moore, Dr. R. L.—Report on Diphtheria in Spring Valley,..... 44
Nativity of students in public schools..... 118
Newbern, N. C.—Report on Yellow Fever in 1864..... 101
New Orleans—Report on Yellow Fever in 1853..... 101
" " —Report on Yellow Fever in 1878..... 102
New Ulm, Diphtheria in..... 41
Northfield, Diphtheria in..... 43
Owatonna, Diphtheria in... 40
" meteorology of..... 111
Owens, J., M. D.—Report on Small Pox at Grand Forks, D. T.... 20
Patton, Dr. G. R.—Topography of Lake City..... 35
Peck, L. W., Prof.—Report on dust fires and explosions..... 94
Peckham, S. F., Prof.—Report on water analyses 86
Physical Record, form of..... 117
" " apparatus for..... 17
" " method of taking..... 17
Physical Data of Minnesota students compared with Naval Academy, Amherst College, and U. S. A..... 125
Pratt, Dr. W. H.—Meteorology of Stillwater, by..... 111
" " —Report on Diphtheria in Stillwater..... 34
Precipitation, table of comparative average..... 109
Privy Vaults; their contents the most common means of well water contamination..... 91
" " how to construct..... 91
Public Halls, violation of law respecting doors of..... 13
Red Wing, statistics of Diphtheria in... 81
Red Wing and Goodhue county—Report on Diphtheria in..... 80
Report, contents table of 5
Report, general of Board..... 9
Rochester, Diphtheria in.... 39
Rochester and country around, Diphtheria in 39
Report on water survey of the State... 11
Rushford, Diphtheria in..... 45
Sanitary water survey of the State..... 11
Sanitary water survey of the State to be continued in 1879..... 12
Scarlatina, statistics of in Minnesota..... 58
Scholastic Methods, relations of to the health of pupils in public schools... 14
Schools, public, health of pupils in..... 116
Simpson, Chas. M. D.—Report on Diphtheria in Minneapolis..... 33
Secretary of Board, serves as Prof. of Public Health at University..... 14

Digitized by Google

Page
Small Pox at Mankato, report on 17
" " at Fisher's Landing and Crookston, report on 18
" " at Grand Forks, D. T., report on 20
" " action of Board respecting 9
" " mortality from in Mankato, 1878 18
" " mortality from in Blue Earth county 18
" " reports on epidemic of, in 1878 15
" " two improtant facts respecting 10
" " legal penalties for neglect to report should be enforced 10
Spring Valley, Diphtheria in 44
Staples, Dr. Franklin—Report on Diphtheria 28
" " —Meteorology of Winona, by 110
Statistics of Diphtheria in Ramsey county 78
" " " Red Wing 81
Statistics of zymotic diseases in Minnesota 57, 58
" " " " Ramsey county 78
St. Charles, Diphtheria in 38
St. Cloud, Diphtheria in 32
" table of temperature and humidity of, by months 110
" meteorology of 110
St. Paul, Diphtheria in 34
" and Ramsey county, Diphtheria in 74
" meteorology of 111
" water supply and sewage of 11
" table of temperature and humidity of, by months 110
St. Peter, Diphtheria in 42–72
" and vicinity, Diphtheria in 72
" table of temperature and humidity by months 110
" meteorology of 110
Stillwater, meteorology of 111
" table of temperature and humidity of, by months 111
" Diphtheria in 34
Stinchfield, Dr. A. W.—Report on Diphtheria in Eyota 38
Soil and water, pollution of by cesspools 11
Students, Minnesota, physical data of, averaged by schools 120
Students of University, table of nativities and parent nativities 121
Sweney, Dr. W. W.—Report on Diphtheria in Red Wing and Goodhue Co 80
" " —Report on Diphtheria in Red Wing 35
Temperature, table showing comparative average by States 109
" and humidity, table of highest and lowest by stations 110
" " " " means by Stations and months 113
Towns, dangers to water supply, report on 11
Typhoid Fever, statistics of in Minnesota 58
U. S. Signal Service—Report on meteorology of St. Paul, Duluth and Breckenridge, by 111, 112
Vaccine, animal, furnished by Secretary of Board at cost price 10
Vaccination, circular of State Board respecting 24
" report on by Dr. E. J. Davis 24
" humanized and non-humanized virus, the use of, report on by Dr. E. J. Davis 24

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Page.
Vaccination, in Blue Earth county, report on 24
" variety of opinions respecting kind of virus used 26
Various means of temperature and humidity 109
Vision, defects of among students in schools 117
Vital Statistics of the State, edited by Secretary 14
" " carelessness in collecting 14
Waseca and vicinity, Diphtheria in 41
Water Supply and Sewers, a system of, essential to the health of towns ... 11
" " of large towns to be studied during 1879 12
Water Survey, Sanitary of State, report on 86
" " " " action of Board respecting 11
Wedge, Dr. A. C.—Diphtheria in Albert Lea 44
Winona, meteorology of 110
" table of temperature and humidity by months 110
" topography of 37
Whooping Cough, statistics of in Minnesota 68
Yellow Fever, action of American Public Health Association respecting ... 103
" " action of Board respecting 12
" " cold checks, but unless very severe, does not destroy the poison 103
" " commission, report of 102
" " first appeared in United States in northeastern cities 98
" " history of in United States 98
" " influence of epidemic constitutions on 100
" " may occur when an average temperature of 75° or 80° is maintained for several weeks 99
" " mode of migration 99
" " in New Orleans in 1878 102
" " not contagious 101
" " often has local origin 101
" " once started spreads regularly 99
" " period of incubation 106
" " preceded by marked increase in severity of other diseases ... 106
" " principal habitat West India islands 99
" " quarantine may prevent 100
" " quarantine often a farce 103
" " report on 98
" " report on in New Orleans in 1853 101
" " sanitary work absolutely essential to control of 101
" " study of an epidemic of, in Newbern, N. C., 1864 101
" " various quarantine regulations respecting 104
Zymotic Diseases in Minnesota, mortality from 1871-1877 58
" " statistics of, 1876 57
" " " " 1877 58
" " " " in Ramsey county 78

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EIGHTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MINNESOTA.

JANUARY, 1881.

PRINTED BY AUTHORITY.

ST. PETER:
J. K. MOORE, STATE PRINTER
1881.

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EIGHTH REPORT

OF THE

STATE BOARD OF HEALTH

OF

MINNESOTA,

FOR THE YEARS

1879—1880.

ST. PETER, MINN.:
J. K. MOORE, STATE PRINTER.
1881.

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MINNESOTA STATE BOARD OF HEALTH.
Secretary's Office, July 1st, 1881.

To His Excellency, John S. Pillsbury, Governor of Minnesota:

SIR: I have the honor to transmit herewith the eighth Report of the State Board of Health for the years 1879-80.

Very respectfully,
Your obedient servant,
CHARLES N. HEWITT,
Secretary.

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CONTENTS:

1. Names and residences of members of the Board.
2. General Report of the Board.
3. Popular Sanitary Councils.
4. Report on Diphtheria.
5. Notes on Cerebro Spinal Meningitis.
6. Vital statistics of Infancy in Minnesota for ten years.
7. Sanitary Water Survey of the State.
8. Report on the Meteorology of the State.
9. Health of Pupils in the Public Schools.
10. History of an Epidemic of Puerperal Fever.
11. Tract on Typhoid Fever.
12. Tract on Small-Pox.
13. Tract on Infectious Diseases.
14. Catalogue of Library.
15. Chemical and Physical Appliances.
16. Financial Statement.
17. Index.

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MEMBERS STATE BOARD OF HEALTH.

D. W. HAND, M. D., Saint Paul, President.
V. SMITH, Duluth.
CHAS. N. HEWITT, M. D., Red Wing, Secretary.
FRANKLIN STAPLES, M. D., Winona.
W. H. LEONARD, M. D., Minneapolis.
E. J. DAVIS, M. D., Mankato.
CH. GRONVALD, M. D., Holden.

NOTE.—All communications should be addressed to Secretary State Board of Health, Red Wing, Minn.

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GENERAL REPORT.

JULY 1st, 1881.

The State Board of Health submit their Report for 1879-80. It was nearly ready at the date of the meeting of the Legislature, but at the request of the board a preliminary report was substituted and the regular report delayed till all the examinations then in progress were completed. The circulars Nos. 1, 2 and 3 were printed separately and have been widely distributed through the State. Up to the date of this report there has been no marked prevalence of epidemic disease with the single exception of diphtheria. Owing largely to the fact that the medical profession, as a rule, came cordially to the support of the state and local boards, popular opinion has been educated by an increase of popular knowledge, and there has been less and less difficulty in enforcing quarantine of the sick and of infected. No other disease has so entirely confined its most malignant attacks to the young, and none, of its class, caused such mortality among them. The circular on Diphtheria of this board (of which thousands of copies have already been distributed, and which will be sent to any address by the secretary) details, for popular use, the opinions of practical sanitarians as to the best means of controlling and preventing this dreaded disease. All parents will find cause for thankfulness and energetic action in the fact that those means are within the power of every family in our population and if further, they will remember that they have a duty to their neighbors as to themselves, they will understand that what protects themselves, most perfectly protects others also. Householders who attempt to carry these rules into actual practice will quickly come to know how essential to their own success is the organization and work of local boards of health, for which there is abundant legal provision for every town of the state. They will learn also how important it is that the executive officer of the board should be an educated physician and that the work of such a board should be constant and energetic. A popular mistake in dealing

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with diphtheria or other preventible disease, is that little can be done till the disease appears in a family or community. This mistake grows out of the belief so common that all diseases are specific or else that they come and go in an order of which we have no knowledge and of which we have little or no control. The error is the natural one of confounding the specific and proximate cause of disease. In vaccination, for example, the specific cause is the virus, but ill health or some peculiarity of the patient may so affect the operation of the virus as to convert the ordinarily harmless vesicle into a corroding ulcer. Or perhaps a better illustration of the secondary or proximate cause would be the common experience of pin-prick. In the vast majority of cases a trifling wound is the only result; but in a case or two the secondary cause, a predisposition to disease, exists, or from some temporary derangement, the little scratch occasions an erysipelas which may be of a very serious character. The removal of these secondary causes, the maintenance of the most perfect health, by constant sanitary supervision of the house by the family, and of the town by local authorities, give the surest guarantee that, if specific disease causes do come, they can be met and dealt with more promptly and successfully than when the standard of health, for the individual or for a community has been lowered by the neglect of the simplest sanitary precautions. In hygiene, as in war, the best place to meet the enemy is on the outposts and the worst, is to permit it to get into the very heart of a population before efforts to expel it are begun.

SMALL-POX.

The statistics of the sea-board cities and of the quarantine stations indicate that small-pox may be introduced into our state by eastern or foreign immigrants during the coming summer and fall. We are not prepared to meet it, because, as we have had no general outbreak of the disease for many years, parents have neglected vaccination. The circular on small-pox herewith published was printed and distributed as soon as the supply of the previous circular on the subject was exhausted. We can add nothing to what is there stated. *Vaccination and re-vaccination are our only real protection against small-pox*—a protection so easy and safe that parents incur a fearful responsibility in neglecting it.

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TYPHOID FEVER.

As to Typhoid Fever: it is very rarely absent from the state. It is liable at any time to become endemic in any town or city where each case occurring is not carefully secluded and disinfected. It is very clearly demonstrated that one case neglected may easily cause many more, and that the infection is chiefly communicated by the discharges from the bowels of the sick. The circular on Typhoid Fever, herewith published, explains how this infection is spread and the easy means of preventing it.

The paper upon "Infantile Diseases as a cause of Mortality" will be distributed through the state at the time when those diseases are most prevalent. The board urgently call upon physicians to co-operate in measures to reduce the sickness and mortality from these causes. We call especial attention to the statistics there given that *the greatest mortality is not from epidemic, infectious diseases as diptheria and scarlet fever, but from cholera infantum, general debility and like disorders which find their cause in the insanitary condition of the houses and places in which children live; also in impure drinking water and improper food.* There is no field in which earnest physicians can reap so full a harvest of good, as in this one, if they will interest themselves, and take hold of the matter in a practical way. The number is constantly increasing, of physicians who recognize this duty and are pleased to be consulted by their clients for the prevention of disease as for its cure. The people at large, especially anxious mothers, have only to seek to find, very great help from the family physician in this direction. Let them advise with him in all matters relating to the health of the family, with the same freedom with which they consult him for the *cure* of disease. The duty of the physician to help *ward* off disease, is almost forgotten in our time, in his recognized duty of coming to the family aid in the effort to expel it, *after it has gained access to the home.*

It will be no fault of medical men in the future if this is so, for they are the ones who, through evil report and good report, have made practical hygiene what it now is. The people have only to put the matter to practical test to discover on the part of their family physician a willingness to give them any aid in his power. Nothing but good can come from such consultation, and the greater the demand for the knowledge which it implies, the wider and more available that knowledge will be. One of the most serious obstacles with which health officers have to contend is the ignorance of practical sanitary work, even among educated men and

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women, and therefore the difficulty of securing such work when, as in the presence of epidemic disease, it is most urgently needed. Among various ways by which the state board of health have endeavored to meet this difficulty the holding of sanitary councils has been one. The report published herewith, of the council held at St. Paul in February 1881, will show our methods and enable the reader to judge of its success, where hearty co-operation is accorded to the effort by prominent men. We wish to call particular attention to the resolution adopted by that council in favor of the organization of voluntary sanitary associations in every town, to co-operate with the local and state boards of health.

The plan of such an organization sketched by the secretary of this board (p 42) will be sufficient to suggest to thinking men and women what they can do to further practical sanitary work in their own communities. No more efficient way of organizing men and women for the doing real good to others can be devised than such associations, under proper direction, become. At first they should be composed of a few earnest and intelligent workers, who as soon as they can see their way to more work than they can alone accomplish may call to their aid, now here and there one, until in a few months they have a well organized and active body of laborers who will be an aid and a stimulus to the organization and work of a local board of health. This board having legal and very extended powers, will be able to enforce the reforms which an intelligent public opinion, worked up by the voluntary association of citizens demands. This is the real difficulty, How to secure the co-operation of educated people in local sanitary work. We believe that one cause is found in the mistaken notion that really efficient effort in this direction requires the personal interference of a physician, and that there is very little that can be done without his personal help.

DISEASES OF INFANCY AND CHILDHOOD.

The causes of the most fatal diseases of infancy and childhood exist in the location, internal arrangement, and management of the house, which is the home for children—see the paper on vital statistics of Infancy pp 117-125 of this report. A careful reading of that paper will be sufficient to indicate a very wide field for sanitary effort by parents and particularly by mothers. And, as in so many other less important matters, womem have, by associated effort, accomplished great good, why not in this, which so nearly concerns the welfare of themselves and their families?

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In the matter of dealing with infectious diseases, small-pox, scarlet fever, measles, diphtheria, typhoid fever and the like, if the reader will study the reports herewith presented it will be readily understood that an educated popular sentiment is of the greatest importance, for without it the efforts of most experienced health officer, backed by the legal authority of the local and state boards of health, will very often fail of adequate results. The obstinacy and stupid indifference of so many people as respects these diseases *when themselves or their families are the sufferers*, is only equalled by their blind fury when others are the victims, and themselves likely to suffer from others carelessness or indifference.

In every outbreak of small-pox, for example, these traits of human character are exhibited and make the work of controlling and crushing out the disease sometimes very difficult.

It has been suggested to introduce the study of hygiene into the schools as one means of popular education. There has been no lack of effort to do this very thing for the last ten years on the part of this board, and yet we are compelled to say that the study is not yet properly pursued in any school in the state. For eight years the secretary of this board has given a brief course of lectures to the graduating class of the University and has established there a system of physical examinations, but no instruction is given by text book, and the lectures are a side issue, attendance is optional, and they are given out of the regular hours. This board have offered to provide lecturers and instruction in practical hygiene in teachers' institutes, and we believe some instruction in physiology is regularly given, but not of the character best fitted to enable teachers to instruct scholars how to prevent and ward off ill health.

We are glad to be able to state that the desire for such instruction is increasing and that we are using every means in our power to satisfy it. We need, for any adequate success, the cordial support and co-operation of every teacher in the state and of every educated man and woman. We hope for help from the sanitary councils which we intend to meet in different parts of the state. The next one will be held at Albert Lea in September, and another in Mankato later in the year.

INTER-STATE CO-OPERATION IN DEALING WITH EPIDEMICS AND INFECTIOUS DISEASES.

We have under consideration a plan for securing co-operation between the states of Wisconsin, Iowa, Minnesota, the territory of Dakota, and the province of Manitoba, in dealing with epidemics

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and infectious diseases. Such a conference will be called by the direction of the Governor, at our request, to meet at Albert Lea in September, and we have assurances that there will be a full representation, and that a simple plan of mutual notification and co-operation in this direction will grow out of the consultation of the representatives of the boards of health who will meet there.

LOCAL BOARDS OF HEALTH.

The present organization of the local boards of health is so imperfect that this board have great difficulty in dealing with epidemic diseases or in securing any regular sanitary work. And the difficulty is not so much in the law, as in the apathy and indifference of local authorities. Outside the larger towns health boards have no *active* existence except in the presence of epidemics, chiefly such as create popular panics, as small-pox, and then as a rule their usefulness depends upon the character of the physician selected as health officer. Their action is very much hampered too by the item of expense; towns inclining to shift it on to the counties and counties on to the state, when it is incurred in dealing with an epidemic.

With the technical justice of the matter we have, here, nothing to do; but the practical effect will be, in the end, to lay the expense of dealing with infectious diseases by boards of health, upon the counties and possibly the state. And yet the *actual management* of the local outbreak is the legal and manifest duty of the town in which it appears.

There is no lack of competent medical men to serve as health officers in nearly every county in the state, but until local boards of health are recognized necessities, and as such are supplied with funds for the practical performance of the duties which are, by law, imposed upon them, it will be very difficult to secure the services of reliable men as health officers.

Another difficulty is the short tenure of office of local health boards and so of health officers. It would be an advantage if the membership could be changed gradually each year, leaving a majority of old members. In the case of a competent health officer he should be retained so long as efficient. The position is not now a desirable one, and the physician who takes it must have an established reputation of his own for honest fearlessness or he must be sustained by those who have. Such support is all essential to him and is a powerful stimulus to the doing his whole duty.

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We are able to report an increase in the number of local boards of health which are active in dealing with diphtheria, scarlet fever and typhoid fever. Since our last report this has been done with varying success. A thorough success is reported on page 56, by the health officer, Dr. A. T. Conley, under whose courageous direction the fight was made. The paper will repay careful reading. It will be seen that the methods used were a judicious combination of legal authority and common sense:

1st. The board inquired as to their powers and what had been done elsewhere.

2d. They asked for and received the hearty aid and support of the state board of health. The secretary visited and co-operated witn them.

3d. By quiet and earnest effort, public meetings were held, and the necessities of the case were thoroughly and intelligently put before the people.

4th. An advisory committee of leading citizens was organized to support and co-operate with the local health board.

5th. As a consequence, when the movement began on the enemy it was a sustained and determined one. Opposition was so jointly and honestly met as to be overcome and the whole village really participated in the final success.

A similar effort in the township of Cannon Falls showed clearly what two or three determined men as town supervisors can do for practical hygiene.

Such examples are a healthy evidence of the utility of local boards of health whose very existence is too often dependent on the impulse of a "scare" rather than a sustained popular belief in their value and constant use. One result is already quite evident; local boards of health are oftener called for and held to an increased responsibility. It will not be the fault of the state board of health if they are not held to the full accountability which their great powers justify, and it will be an occasion of sincere congratulation when in every town such a board can be found, ready at least for the emergency of infectious diseases, if not for the routine work which is, after all, the most important of its duties.

We are very glad to be able to state that, after years of effort to that end, the medical profession and the mass of the people are now satisfied of the infectious character of diphtheria and that this belief has borne good fruit in attempts, as above noted, to stay the progress of that pestilent disease. If the reader desires to read evidence that diphtheria is a very infectious disease, and that

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its spread is more frequently determined by that peculiarity than by secondary causes, let him study the paper on sanitary councils, and the general report on diphtheria, p. 67, also special report by Dr Berry, p. 106.

Those papers contain but a tithe of the evidence which can be found in previous reports, and in the correspondence of the board. The experience in Minnesota seems enough to settle the question, but we refer to like evidence scattered all through current sanitary literature to the same effect. Because of this evidence, and of the fearful mortality which accompanies true diphtheria, we again call upon local boards of health, and parents to renewed efforts to expel this disease which at times seems likely to become endemic in some localities. *Seclude every case of Diphtheria.*

There is another disease which inflicts a heavy loss of life and efficiency on the adult population of our state every year—typhoid fever. Tract No. 3, p. 171 of this report, sums up the most reliable information at our command, and gives in connection with tract No. 1, p. 185, the details of methods for controlling and preventing its occurrence. We call particular attention to these papers and to the truths which they contain. Let it be clearly understood that even when our best physicians and sanitarians differ as to the possibility of isolated cases occurring without a specific cause, none deny that the disease is thereafter spread by a specific poison in the discharges from the bowels of the sick. The importance of this practical fact cannot be overestimated in efforts at preventing the spread of the disease. The most important thing to do is to *disinfect all such discharges* before they are removed from the sick room, by the free use of a saturated solution of Sulphate of Iron (green vitrol), which salt is cheap, easily used and efficient. With so easy an effort as this disinfection implies, this fatal and tedious disease may be brought under such control as to be an exceptional occurrence, even in crowded towns. What excuse therefore, is there for so large a sick and death rate from typhoid fever? There is none, and the responsibility for the neglect of these simple measures should rest on physicians and people alike, until *all* will use such knowledge to help put this fever (at present a leading cause of mortality in Minnesota) in its proper place as one of the least. If the human suffering and premature death which it is admitted to cause can be estimated in trouble and money, then compared to such cost, the use of these easy precautions will be rightfully regarded as a trifling outlay for so great and helpful results.

The circulars and tracts of the board on these subjects can be

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procured of the secretary. If local boards of health and thinking citizens will reprint them in local newspapers or publish articles of their own, to the same effect, they will help towards the popular understanding of the matter, and save many a week of sickness and hundreds of premature deaths. In this connection, we call attention to increasiug danger from the accumulation of refuse in privies, cess-pools, and other ways, upon, or *in*, the soil of towns and cities. A reference to the water analyses made in the laboratory of the board (p. 134) will show how these collections of filth are poisoning the well waters, which are the chief source of supply to the population. In several instances, springs locally famous for the purity of their supply, have become too foul to drink, and in a case or two, for any use whatever.

None of our towns are yet adequately supplied with water works. Minneapolis is in greatest need. Her supply from the river is good, but its distribution is not yet general. We have repeatedly urged taking the supply *above* the town. It will probably be done, and the sewers and water mains extended. The city's growth has been so great that such provision is difficult. When that is done and the distribution is general, the influence will be marked upon her sickness and death rate. At present the well supply is, as a rule, bad; in some parts of the town should typhoid fever appear it will probably be spread through the entrance of its specific poison into many wells. The attention of the health authorities of the city has already been called to this danger.

The water supply of St. Paul is very fine at present, from Lake Phalen, but they will have to seek other sources and give it a wider distribution. The sewerage system of both cities is far from complete, and the disposal of garbage into the river, as is done in large amount, at Minneapolis, should be forbidden by law.

If the two cities could come to some arrangement as to a common abbatoir, on the plan of that at Brighton, Mass., or a better one if it can be devised, where all slaughtering should be done and the rendering of animal refuse done on scientific principles, great good would be accomplished. As financial ventures abbatoirs pay, and from a sanitary stand-point they are essential in all great centers of population. Stillwater has provided for an abundant and pure supply of water, and Winona is at this time considering a change in her supply which at present is taken from wells near the river bank. Compare analysis of domestic well water with this supply in Winona, No.'s 81-88, p. 136 of this report.

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We are studying methods in use elsewhere of water supply, sewerage, and the control of offensive trades, and hope to be able to procure plans available for our smaller cities and towns. These things are much more cheaply and easily provided for early in the history of a centre of population than later. The literature of the subject is abundant, but the use of patented appliances not infrequently adds to cost without proportionate benefit. The essential thing is to co-ordinate the sewerage system with the water supply. Because of cost it is not uncommon to introduce a water supply and leave the sewerage system till later, or what is perhaps worse, attempt to use a partial system of surface water drains for sewerage purpose. The result is saturation of soil with sewerage, a very serious danger to the water supply from wells.

WELLS AS A SOURCE OF DRINKING WATER SUPPLY.

We call particular attention to the report on Drinking Waters, p. 129, and to the increasing danger of well poisoning from the infiltration of animal excretions from cess-pools, privies, manure heaps and the like. It is of the utmost importance that every householder should understand the danger to the health of his family from impure drinking water. Beside taking care that surface water is kept out of wells, as much care should be used that the supply is taken from the bottom of the well or at least below an impervious stratum of clay or stone, down to which the well should be walled up with hard burned brick or stone laid in hydraulic cement.

When the water supply is of necessity surface water or water coming in to shallow wells from the adjacent soil the supply should be suspected, in case of sickness among those using it. It is always best to filter such water before drinking it, and a simple filter made of a large flower pot, in which are put alternate layers of fresh charcoal and clean sand, well pressed down, will serve a good purpose. Such filters should have for the upper layer fine clean sand, which will retain any solid matters in suspension in the water, and should be frequently renewed. The entire filter should be allowed to dry out every few days, in the sunlight, and then the first water run through it should be thrown away. Once a month it is well to change all the filtering material; or if new cannot be readily obtained, the old should be washed and dried, and then may be used again. The silicated carbon filter is probably the best in the market, among patented articles, but the one above described within the reach of every family, is a good one.

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CISTERN WATER FOR DRINKING PURPOSES.

The popular suspicion of well water is making the resort to cistern water for drinking purposes more and more common. Rain water collects impurities from the air (which it washes) and from the roofs and gutters over and through which it runs into the cistern. (See analysis on page 138). The annual cleaning of, even the best, cisterns shows what an amount of offensive matter goes in with the water. The ordinary filter is a brick wall; at the best, its operation is mechanical and most matters in solution go through unaffected by it. It is a question, still undecided, whether pure rain water is the best for children and whether the lime, magnesia, and iron in spring and well waters are not natural sources of supply for such elements necessary, to digestion and growth. In any event, all cistern water should be filtered before drinking, and every precaution should be taken to keep the cistern clean and well ventilated.

ICE IN DRINKING WATER.

Care should always be taken that ice used for this purpose is clear and clean. Instances are upon record where it is not unlikely that offensive matter has in this way gotten into drinking water, and sickness has been occasioned by it.

METEOROLOGY OF THE STATE.

Our thanks are due to the gentlemen who have aided the committee of the board in this important study. Reports are received regularly from eleven stations in different parts of the state. We have the co-operation of the U. S. Signal observers, and the data so secured are of increasing value. There are many records made by individuals of which we have not yet secured reports. It is hoped to obtain them, as also records of the observed relations of meteorological phenomena to disease prevalence. A striking illustration of this relationship is quoted in the report p. 145.

Taken altogether, the retrospect of sanitary work in Minnesota for the years 1879-80 is an encouraging one. There is greatly increased popular interest in all matters pertaining to health, but chiefly in the means of preventing infectious diseases. Local boards of health are increasing in number and efficiency, and they are securing more and more the support and co-operation of the best of all classes of people.

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The policy of the state board of health has been to encourage and assist all local efforts for sanitary reform. We believe that the local board of health should be the responsible authority in its district, and that everything which increases its influence or efficiency is clear gain for the whole State. A great need, perhaps the greatest at this time, is thoroughly educated health officers. Physicians, who knowing the science and art of hygiene are not merely executive officers of the law, but, what is far better, teachers of the best methods of sanitary work.

This board are fully convinced of another principle, that all sanitary work should proceed upon the assumption that the hygiene of the house and family which make the home, is the unit of public hygiene whether for the town or the state, and therefore we are using every effort to increase public knowledge in that direction.

As respects infectious diseases, we rely upon prompt information of their appearance from local health boards, or in their absence, would be thankful to any responsible person for giving it. In thinly settled districts, where physicians are rare, it is the duty of the town clerk to give such information. Several times we have received such notice from ladies, mothers of families, in the district invaded. For such information we are under many obligations.

We go on to another year's experience and work encouraged by the knowledge that hygiene, the art of preserving our most valued possession, health, will grow more and more in popular confidence and respect, and will win in the near future a hearty and general support. Its legal penalties will be less potent than the educated dread of preventible disease and premature death, and the punishment of an outraged public sentiment will be visited upon all who obstinately and willfully disobey the laws whose sole object is "to render growth more perfect, decay less rapid, life more vigorous, death more remote."

D. W. HAND,
CHAS. N. HEWITT,
V. SMITH,
FRANKLIN STAPLES,
W. H. LEONARD,
E. J. DAVIS.
CH. GRONVALD.

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FINANCIAL STATEMENT, 1879-80.

Receipts.

1879.		
July 26.	Rec'd from State Treasurer cash for expenses of board for 1879, from appropriation of 1879	$136 60
Aug. 26.	" " "	79 15
Sept. 26.	" " "	117 25
Oct. 25.	" " "	25 65
Nov. 12.	" " "	154 50
" 25.	" " "	111 80
Dec. 31.	" " "	196 55
" 31.	Salary of Secretary for 1879	500 00
	Total to be accounted for up to date	1,321 50

Statement of Expenses of Board for 1879.

Laboratory expenses	$84 00
Stationery and postage	12 70
Printing and binding,	91 60
Books and publications	47 00
Express and freight charges	11 15
John Goodnow, assistant in laboratory	167 95
Beeker & Sons, chemical balances	80 00
Prof. Peckham, analyses	10 00
Dr. D. W. Hand, expenses as delegate to Am. Pub. H. Ass'n., and other expenses	112 05
Dr. F. Staples, traveling and other expenses	52 00
Dr. E. J. Davis, traveling and other expenses	21 50
Dr. W. H. Leonard, traveling and other expenses	20 00

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Dr. V. Smith, traveling and other expenses	33 25
Dr. Ch. Gronvald, traveling and other expenses	10 00
Dr. C. N. Hewitt, expenses as delegate to Am. Pub. H. Ass'n.	68 30
Secretary's salary for 1879,	500 00
Total,	1,321 50
Unexpended balance,	178 50
Appropriation for 1879	1,500 00

Receipts.

1880.		
Jan. 29.	Rec'd from State Treasurer cash for expenses of board for 1880, from appropriation of 1880	$75 08
Feb. 26.	" " "	91 20
Mar. 26.	" " "	112 68
Apr. 26.	" " "	32 06
June 25.	" " "	135 15
July 26.	" " "	108 92
Aug. 25.	" " "	76 59
Sept. 27.	" " "	33 40
Nov. 17.	" " "	87 30
Dec. 31.	" " "	145 63
Dec. 31.	" " "	100 00
Salary of secretary for 1880,		500 00
Total to be accounted for up to date,		1,498 01

Statement of Expenses of Board for 1880.

Laboratory supplies	$58 38
Printing and bookbinding	206 96
Books and publications	104 28
Stationery and postage	31 87
Express and freight charges	32 95
Telegraphing	5 33
John Goodnow, assistant in laboratory	251 59
A. M. Rankin, assistant in laboratory	48 76
Dr. C. Berry	4 05

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Welcome & Howe, expenses of water collection	2 00
Janitor services at sanitary council St. Paul	5 00
Industrial Pub. Co., microscope	40 80
Dr. D. W. Hand, traveling and other expenses as delegate to Am. Pub. H. Ass'n.	56 50
Dr. V. Smith, traveling and other expenses	13 50
Dr. E. J. Davis, traveling and other expenses	25 90
Dr. F. Staples, traveling and other expenses	48 94
Dr. Ch. Gronvald, traveling and other expenses	19 45
Dr. C. N. Hewitt, traveling and other expenses	42 40
Secretary's salary for 1880,	500 00
Total,	1,498 66
Unexpended balance	1 34
Appropriation for 1880,	1,500 00

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POPULAR SANITARY COUNCILS.

WITH REPORT OF THE COUNCIL HELD AT THE CAPITOL IN ST. PAUL, FEBRUARY 16 AND 17, 1881, BY

CHARLES N. HEWITT, M. D.,

Secretary State Board of Health.

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SANITARY COUNCIL.

For several years this Board have been devising means to establish a system of public instruction in hygiene, by means of popular conferences. We began by using, so far as practicable, teachers' institutes, but failed in this way to reach the people at large. We have used the daily papers of the State to some extent, but in that way alone cannot secure that general attention which we wish. After due deliberation the first of what we trust will be a continued series of councils was called to meet at the Supreme Court Chamber, in the capitol at St. Paul, on February 16 and 17, 1881, and the following are the reasons which prompted the step:

The study and work of hygiene in our time are peculiar, in that they are popular as well as professional.

The dangers to life and health incidental to our civilization compel an increasing number of people to study a subject which lies so near to every man's interest, but has by a variety of circumstances hitherto been kept so far from his practical knowledge. Once disease and premature death were thought to be the direct visitation of deity, and epidemics, scourges for national sins. But when one of the most terrible of plagues, small-pox, was met and conquered by vaccination, so that now it is the most easily prevented of diseases, and can never again be a scourge, people saw light, and began, as did physicians, to inquire whether other diseases might not be similarly dealt with? No other such specific method has been discovered but soon will be, and if Pasteur's experiments prove successful, as they seem likely to do, other diseases will be amenable to a modified innoculation and be brought more nearly under sanitary control. In the search for such methods we have come upon positive evidence that a large proportion of other epidemic diseases can be, to a considerable degree, prevented. Their spread, when

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they do occur, can be limited, and they can be deprived of much of their virulence and fatality. We have to-day the comforting assurance that the medical practice of the future will concern itself more and more with the efforts to prevent disease, instead, as now of awaiting its attack. And what is still more encouraging, people themselves can learn something of the art of preventing sickness and untimely death.

Physicians and sanitarians are calling upon all sorts and conditions of men to learn and to act. They have freely opened to them the knowledge which they have so hardly won. The field, not yet explored, is rich with the certainty of valuabe discoveries, if thoroughly searched. Helpers are needed, and there is room and work for all. We know, even now, that in efforts at disease prevention we find the means of health preservation, and so increase the average of ability to do and to enjoy, not only for individuals and communities, but for States and nations.

To test the interest felt by leading citizens in matters of public health, invitations were extended to some of them to come to our aid. Their answers enabled us to issue the following programme for the Sanitary Council, which met in the Supreme Court Chamber at the Capitol, on Wednesday and Thursday, February 16 and 17, 1881 :

WEDNESDAY, FEBRUARY 16.

First Session, 2 P. M.—Prayer by Rev. Mr. Thomas. The Governor presided and addressed the council. General subject: The prevention of epidemic disease and the hygiene of the home.

1st Paper—By Rt. Rev. John Ireland. Subject: The duty of clergymen as respects public hygiene, especially co-operation with local and State boards of health; and also the influence which, by precept and example, they can exert on the Hygiene of family and home life.

2d Paper—By Rev. Dr. Sample, of Minneapolis: Sanitation of the home; from the standpoint of a clergyman.

3d Paper—Rt. Rev. H. B. Whipple. Subject: The hygiene of the home a religious duty.

Discussion.

Evening Session, 7:30 P. M.—Lt. Gov. Gilman, presiding. General subject: The hygiene of the criminal and dependent classes of our population.

1st Paper—By Hon. Cushman K. Davis. Subject: The hygiene of crime in its legal aspects. The influence of prison life, and the legal steps advisable to make legal penalty reformatory.

2d Paper—By Rev. J. A. Riheldaffer, superintendent of reform school. Subject: The sanitary outlook of the reform school.

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3d Paper—By Dr. J. E. Bowers, superintendent Rochester hospital for the insane. Subject: The causation and prevention of insanity.

4th Paper—By Superintendent Noyes, of Faribault: The hygiene of the deaf dumb and blind.

Discussion.

THURSDAY, FEBRUARY 17.

Morning Session, 10 A. M.—Ex.-Gov. Marshall, presiding. Prayer by the Rev. D. R. Breed.

1st Paper—By Rev. Dr. R. F. Sample. Subject: The hygiene of the home, from a clergyman's standpoint.

2d Paper—By Dr. O. J. Evans, health officer of Minneapolis. Subject: The difficulties in the way of the health officer of a city in the performance of his official duty.

3d Paper—By Dr. A. T. Conley, health officer Cannon Falls. Subject: The story of a successful attempt to crush out diphtheria by a local board of health.

Discussion.

Thursday Afternoon Session, 2 P. M.—Chief Justice Gilfillan, presiding.

*1st Paper—By Mr. A. C. Rand, mayor of Minneapolis. Subject: Water and water supply.

2d Paper—By Daniel R. Noyes, Esq. Subject: Sanitary influence of the Young Men's Christian Association.

3d Paper—By W. W. Folwell, president University of Minnesota. Subject: What ought schools to do for physical culture?

Discussion.

Thursday Evening, 7 P. M.—Rt. Rev. John Ireland, presiding.

1st Paper—By J. A. Dodge, professor of chemistry, University of Minnesota. Subject: Some adulterations of food. This paper was illustrated by samples under the microscope.

2d Subject—The impurities of air and of water; their origin and relation as causes to disease, with a brief review of the means popularly available for their removal or destruction, by the sectetary of the State Board of Health. The subject was illustrated by the use of a variety of microscopes and by examples of such impurities from water and air.

Discussion.

Adjournment.

The following report of the proceedings of the council is taken from the Pioneer Press, which paper, as often heretofore, has aided heartily in our efforts to increase popular knowledge and activity in matters of health:

*Received too late for council.

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It will be seen that the object of the disscussion at the first session was to demonstrate the necessity for a more active and intelligent co-operation among educated people. As the resolution moved by Bishop Ireland and seconded by Rev. Mr. Thomas indicates, the weight of opinion was in favor of voluntary sanitary associations, something like what is already being done in the East. The paper on the subject, which appears in the report of the meeting, outlines such organizations. No one can dispute that there is need of them in Minnesota.

No more efficient stimulus and aid to popular sentiment in the direction of better care for personal and family health can be devised; provided that men educated in other directions will become so in this, and not be satisfied with the iteration and reiteration of mere platitudes, or with such a smattering of hygiene as make one a bore and the subject tiresome. Not that they are to become experts in public hygiene, but that they, every one, aim to be such in that of the family and the house. It is just here that such associations will do most good, and so it is needful that women—mothers—become active members. They are the ones who most keenly feel the need of some efficient means to keep disease from the little ones and the hearthstone. They are the ones, too, whose patient waiting and silent labor can move such work, nearer than any other, to a successful consummation.

The meeting of the sanitary council at the Supreme Court Chamber at the capitol on Feb. 16, was quite well attended, a lively interest was taken in the papers presented and the discussion that followed the reading of each. Gov. Pillsbury called the council to order, and the proceedings were opened by prayer by the Rev. Dr. Thomas. The governor then welcomed the gentlemen of the council. He said that in the formation of a new State an industrious, healthy and vigorous population is of the first importance. While our industrial and commercial pursuits are developed, the sanitary conditions of the people should not be overlooked. He was proud to know that Minnesota was among the first to establish a State board of health; Massachusetts first, California second, Minnesota, third; and it is largely owing to the work of this board that the sanitary condition of the people has been maintained at so high a standard. The subject of sanitation was one upon which every man, woman and child should be as thoroughly as possible informed. The governor closed with a warm welcome to the delegates to the council, and introduced Bishop Ireland as the first

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speaker, who read an essay on The Relations of Clergymen to public Hygienie, an abstract of which is as follows:

Public hygiene is undoubtedly a subject in which the clergyman must needs take a deep interest, however much or little he may be able to do in favor of it.

His immediate ministry concerns itself with the soul—the spiritual and moral nature of man. He labors to prepare him for a life of divine blessedness hereafter, by teaching him in this life to submit his intellect and his will to divine laws. But man has a material as well as a spiritual nature, and so intimate is the union, so closely are the acts of the soul interwoven with those of the body, that we cannot care for the one, if we completly overlook the other. Meus sana in corpore sano—a healthy soul is a healthy body—such is the human ideal, and such the condition of plenary health, in the ordinary course of things, for soul or body.

Physicians can tell how potent for good is the influence upon the body of a pure and well regulated mind. I will say as a clergyman, that our efforts in cleansing man's moral nature, and in raising up the hopes and aspirations towards the skies, receive vigorous and welcome co-operation from the natural forces which constitute and surround the body. I can endorse the words of Prof. Tyndall, and be, as far as these words go, "a materialist" with him. "So the years roll by," he says in a late article on the Sabbath: "The term 'materialist' will lose more and more of its evil connotation, for it will be more and more seen that the true spiritual nature of man is bound up with his material condition. To wholesome food, pure air, cleanliness—hard work, too, if you will, but also fair rest and recreation—these are necessary not only to physical but to spiritual well-being. The seed of the spirit is cast in vain amid stones and thornes, and thus your best utterances become idle words addressed to the acclimatized inhabitants of our slums and alleys." The clergyman is in full accord with the physician as to the means to be employed in the promotion of hygiene. These are the study and the observance of the laws of nature. The action of the church in this relation has not always been rightly understood. Alluding to the middle ages, John William Draper says: "It had always been the policy of the church to discourage the physician and his art; he interfered too much with the gifts and profits of the shrines. For the prevention of disease prayers were put up in the churches, but no sanitary measures were resorted to."

And I presume Mr. Draper would ridicule no less the modern church than the medieval one when told that the church of to-day has the same faith in prayer and miracle which she had six or ten centuries ago. Mr. Draper writes without having taken pains to inform himself as to the real facts in the case, hence he, and not the church, deserves the ridicule of thoughtful men. Help yourself and God will help you—this maxim has been in all ages the substratum of the teachings of the church in relation to prayer, and to miracles in answer to prayer. The Creator has established certain laws for the government of the physical as well as of the spiritual and moral world, and he has given to man an intelligence whereby these laws may be known. If, through wilful negligence or conscious supiness of character, we transgress these laws, and then appeal to God to protect us against the results of our transgressions, we are simply praying to him to reward our own criminal neglect, to do which the church tells us, is something scarcely short of blasphemy. The man, priest or layman

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who, in the presence of a fatal epidemic would fold his arms in submission to what he would deem a visitation from God, and refuse to invoke the aid of human science to stem its invasion of the home, knows but little of the true teachings of the Christian church, and in the eyes of God and of his fellow men richly deserves to die a victim of his own ignorance and folly.

True, a thousand times true, when all natural means available have been tried and found powerless, the church bids us pray and call upon God to do what man cannot do. Nor will right-minded science take objection to prayer and the hope of special providences in such instances. The laws of nature, the partisans of Mr. Draper might say, are inflexible, and prayer is useless. Are not the laws of nature subject to the control of human power, and however inflexible they may be in certain given conditions, cannot the results which would follow from the permanence of such conditions be preventad by new arrangements and complications and bringing new laws into operation—the reign of law being always supreme? When the physician is called into the sick room he is asked to control the laws of nature, and who will say that it is unreasonable, unscientific to allow to the Supreme Being what we allow to the physician? The difference between a miracle, a special providence and the ordinary action of the physician in the application of the healing art is one of degree. When the effect produced is the result of human power and skill, it is termed a natural act; when it exceeds man's ability it becomes a miracle.

No doubt, in past ages, Mr. Draper might say: Christians were taught to pray in the presence of certain epidemics which science to-day would effectually master. Yes, but the science of to-day was of no service to men in the middle ages, and when they did all that was possible to them in their conditon of knowledge, prayer to God was in due order.

The nineteenth century knows many things—the results of experience—which the tenth or twelfth did not know. Need we wonder? The race is older now. and the adult who despises the child for its comparative ignorance has not sense if he has knowledge. Mr. Draper should be careful; he does not know all things yet; and other Drapers in the twentieth and twenty-first century may be found to laugh at his puerile scientific notions.

As to the practical work which clergyman can do toward the promotion of hygiene, the Bishop suggested the following points:

First—The clergyman will do well to explain to his flock the importance for them of the rules of hygiene, and their duty to study and observe them.

Second—He should see that the rules are duly observed within buildings under his own control—churches and school houses.

Third—In instances of death from contagious disease, he should prevent public funerals.

Fourth—In his visits to his parishioners, especially the poor, he ought to call their attention to this subject of hygiene, and notice whatever defects may be observable in and around their dwellings. A word from him in the right direction will work wonders.

Fifth—As a leader of thought, and one who by his profession is obliged to labor for the good of others, he should be first among those who labor by the formation of boards of health and other sanitary organizations to improve the public health. Such organizations do good, especially in smaller communities, villages and country settlements.

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THE SUBJECT DISCUSSED.

Rev. Dr. Thomas was called upon. He had not expected to make a speech. Bishop Whipple, he said, had promised to prepare a paper for the council, but the state of his health would not permit the fulfilment of this purpose. Regretting this inability, the bishop sent assurances of sympathy with the movement. For himself, the relations of the clergymen to sanitation was a new idea to him; but he thought clergymen and physicians should work more together. He was frequently placed in awkward positions for lack of a better understanding with the medical fraternity, and he thought much good might be accomplished in this direction.

Rev. D. R. Breed congratulated those present upon the meeting. He was in somewhat the same condition as Dr. Thomas. The two professions should come closer together. They are called into the same houses at the same time. In many cases ministers are called into houses where physicians are not called, and yet where they were needed. The clergy enter many homes where there are nervous, dyspeptic, miserable inmates, not dangerously ill, but unable to work, and where the whole guilt lies in the home. One-quarter of the disease in winter might be avoided by attention to ventilation and kindred matters. Half the houses in Saint Paul are badly ventilated. He saw a great deal of this and had often tried to give people some ideas on the subject. Other evils were mentioned, as foul water, tainted wells, imperfect sewerage, unwholesome food, and carelessness in the rearing of children. Clergymen call into a house at all times; physicians only when people think they can't get along without them. The former knows how people live, and should have some general ideas about sanitation, in order that he might work to advantage with the physician.

Dr. Dana endorsed the last speaker. In pastoral visits he frequently saw so many things awry that he could scarcely hold his tongue. The alphabet of hygiene is utterly unknown among the masses, and the danger in teaching them was that we would commence at too advanced a stage for their comprehension. He complained of the ventilation of churches, and said many of the latest and most costly structures were built without the slightest regard to this matter.

At this point the governor was obliged to leave, and called Rev. J. H. Riheldaffer to the chair.

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FURTHER DISCUSSION.

Rev. Dr. Barnes said the Great Physician, when on earth, was a healer of bodies and souls. He wanted instructions from physicians, especially as to the wisdom of pressing religious matters upon the attention of the sick.

Dr. Leonard said there should be an understanding; the last speaker had touched the key-note. The matter of introducing religious topics should depend upon the state of mind of the patient. If the patient was anxious or willing to have the subject broached it would be likely to be beneficial. But if he were unwilling, it should be done very cautiously, if at all; otherwise it might demoralize the patient.

Dr. Hewitt called attention to the fact that the discussion was getting away from the subject. The subject was: What can be done to promote public health? With all due respect to the clergy, they seemed, from remarks this afternoon, to be in their infancy in this matter. He urged them to study sanitary science —to make the subject of hygiene a part of their work. The literature was superabundant. The clergy should first put its teachings in effect in their own persons and households, and then introduce it to their flock. They should unite in supporting boards of health in their work. This work now mainly consisted in dealing with epidemics. According to the general public opinion, they were lazy, worthless sentinels, who slumbered until the enemy got astraddle the ammunition, and then sprung to their arms. Their true mission was the prevention of disease. The work of the sanitarian was the preservation of the highest possible average of public health—the building up of the health of individuals, families, and the community at large—the greatest good of the greatest number. The Master and his disciples had a full appreciation of the holiness of the body. None could do so much for the cause as the clergy. If they would teach the people they would greatly assist the physician. He called upon them to prove by their works that they moved in a purer and higher plane than the physicians, and to bring the latter up closer to them, and to the good and the true. He then presented the following synopsis of a plan for popular sanitary work:

VOLUNTARY SANITARY ASSOCIATIONS.

As showing how the citizens of our cities, towns, and villages may, by organization, aid in the diffusion of sanitary knowledge, study the sanitary needs of

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their own homes and houses, increase their protection from preventable disease and stimulate and aid the work of boards of health, the following brief summary of what has been done outside our State will be of use:

This advance in sanitary work was first practically made in Edinburg, Scotland, under the direction of Prof. Jenkin of that city, in 1878. It was speedily adopted in Newport, R. I., for the first time in the United States, in the same year. Since then the number of such associations has increased in the East, showing the appreciation of their usefulness, both among the people themselves and professional sanitarians. The essentials are simple enough. A number of householders in any town organize for the following purposes:

First—To study the art of hygiene as available for increasing the healthfulness of the houses in which are their homes.

Second—As growing out of the first, to learn the sanitary condition of the town in which they live.

Third—To encourage and support the execution of sanitary legislation by their local board of health, and to supplement their efforts by such assistance as may be necessary, especially as respects the houses of the members of the association, in the inspection of sewage disposal, water supply, etc.

To the associations of cities, where these problems are often of a very complicated character, the opinion of a competent sanitary engineer is often of the greatest value. It is usual to charge an entrance fee, which is used for current expenses, inspections, publication of brief pamphlets on sanitary subjects, and distribution of reports. It is important to remember, however, that the scheme for such organization may be varied by circumstances and consequently is adapted to varying needs. In Minnesota our greatest need for such organizations is in townships and villages. In such communities active health boards are absent, except in event of an epidemic, when the supervisors are the board, and, the epidemic gone, they as a health board adjourn *sine die*. As a result sanitation is at the lowest ebb—nothing is practically done. The true remedy is in the hands of any half dozen thinking and reading men and women who will effect such organization as that here suggested. Their first duty is to make sanitary survey of their own homes and of the township. To awaken interest and increase information, let them call in the physician or physicians of the locality most interested in sanitary matters and make him chairman of the committee on survey. After his report lay out the work accordingly. Let each member take a special department for study. Let one take ventilation, another, water supply; another, the disposal of filth; another, the prevention of diseases. If they are at a loss for the literature of the subject, a postal card to the secretary of the State Board of Health, who lives in Red Wing, will secure the desired information. I may say in passing that Wilson's books upon hygiene, published in Philadelphia, are capital manuals for popular guidance, as are also the little manuals published by the English Society for promoting Christian knowledge. The study of water and air affords abundant field for the exercise of one's faculties either for amusement or instruction. Microscopes are so cheap and so good now, that such an association could, by small individual contributions buy one, even if some individual did not. Its use in sanitary study is very helpful and often important. The ordinary sanitary chemistry of water is not difficult. The study of heating and ventilation of school buildings and houses and their practical improvement, is within reach of such associations. Their study of the rules for preventing infectious diseases and for controlling them, will make

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the members intelligent co-operators with physicians, whose work is materially lightened and aided by such assistance as intelligent popular opinion can give.

I cannot impress too thoroughly upon the educated classes, professional and business, their duty in this regard. My experience for eight years as secretary of the State Board of Health has impressed it upon me very forcibly. Nothing more pitiable can be imagined than the condition of a thinly settled township or village in the presence of epidemic disease other than small pox. The suffering, hardship and premature death which has occurred simply because the people did not know what to do, and local authorities were alike ignorant or indifferent, cannot be estimated. It will not do to lay the blame, as is too often done, upon physicians. The physician lives by his profession. The cash income from his patients is his visible means of support, and it is common enough to charge that his interest is that people be sick and keep sick, and that he is not likely to be very active in preventing what supports him. This may be an average standard of business honesty among those who say it; but I am proud to say that the standard of the medical profession is not that, and to claim the testimony of all that hear me in proof. Alone and unaided, suspected and even abused for his meddlesomeness, I can testify that many a physician, not only or chiefly in great centres of population, but in all parts of the State, has made vigorouos efforts for the public health of his community, and often despite that community has made progress against epidemic disease. More and more the physicians of our State are teaching hygiene by their own example and by their instructions at the bedside. If our other educated classes will manifest, not merely in word, but in deed, a like disposition to do, such measures as are here advocated will become the rule, not the rare exception, in our State, and the sanitary work of local and State boards will be encouraged and supported by the popular verdict that nothing shall be left undone which public health as an art can do to prolong life, prevent disease and insure the health and happiness of our people.

Dr. Hewitt called out Dr. Berry of New Ulm, who said he was a worker and not a talker. When diphtheria had appeared in his district he had tried not so much to cure it as to prevent it. Had endeavored to establish a local board of health, and the only person who had aided him was a clergyman. Their water supply at New Ulm was bad, and more than a year ago he had told the mayor that if something were not done they would lose a half hundred children this winter, and was sorry to say his prediction had been verified. He could not impress upon people that diphtheria was contagious, and was working under great disadvatages in other ways. (Dr. Berry's report on diphtheria in Brown and Nicollet counties on another page gives his opinion in detail.)

Dr. Hagan of St. Paul said that from the remarks of the clergy, it had occurred to him that they could assist the physicians greatly. Every family in St. Paul, however poor, should have a regular physician, who should visit the family at least once a month and make a thorough survey of the premises, and see that everything

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upon them was in good condition—should aim to keep his charge in health, not to let them get sick. Half a million people died last year from preventible diseases. Every family should be taught the nature of diseases, the difference between them, and how to escape them. We should drive away all contagious diseases. A few years work in this direction would generally improve public health and promote longevity.

Senator Wedge was called upon, and excused himself as not being conversant with the subject.

Dr. Hewitt spoke of a statement he had seen in a State paper that diphtheria was due to excessive ventilation. The clergy wield facile pens and could do much towards puncturing and exposing such absurd errors. There should be a constant iteration and reiteration of the cardinal principals at issue.

Dr. Hagan spoke of the sickness among the very poor. Those comfortably well off enjoyed ten or twelve years more life on an average than the poor. This was very largely due to blood poisoning from bad ventilation, resulting in various forms of fevers, cerebro-spinal meningitis, etc.

Dr. Mattocks said that, following out the idea suggested by Dr. Hewitt as to the work by the clergy, they would probably say they were willing to do this, but did not know what was needed. He briefly suggested that they teach their flocks to be cleanly and Godly. These were the principal things.

Dr. Dana inquired if there was not at times a necessity for the support of the local board. He had had occasion more than once to call on the authorities to remedy abuses in tenement houses. Was there not an opportunity for local boards in this direction?

Dr. Mattocks thought the boards had sufficient power in such matters, and explained some points. No man should move into a house until he had made a thorough survey of the premises and ascertained its sanitary condition. In case of property belonging to non-residents, it was difficult to reach the matter, on account of the law on the subject.

Bishop Ireland thought it advisable to adopt resolutions regarding the formation of voluntary sanitary associations in small places, There were always a few intelligent men in a community who would take interest in such movements. After some discussion he offered the following which was unanimously adopted:

Resolved, That the council urge upon communities the organization of voluntary sanitary associations, to co-operate with the local and State boards of health.

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EVENING SESSION.

Lieut. Gov. Gilman presided at the evening session.

Hon. C. K. Davis read a thoughtful paper on the hygiene of crime. He said, in substance:

What are called civil rights are amply cared for, while the criminal department of administration is crude. The individual is left to his primal liberty and impulse toward transgression, care being only taken to punish, not to prevent. While philosophers had sought remedies for these evils, politicians were the last of men to learn the lessons taught in books, and seldom learn them at all until they learn them of the masses. The doctrine of the irresponsibility of the insane, inoculation for small-pox, and other steps in social and moral progress had made their way, not as the result of thoughtful statesmanship, but through the force of circumstance. The indifference of states to the prevention of crime was greatly due to theological notions that there is something in the nature of sin with which physical causes have nothing to do. Crime is often a disease which, while demanding punishment, also demands that punishment shall cease to be wholly retributory in its character, but shall also be corrective. The speaker considered the different classes of crime in relation to their periodicity. There are seasons of various crimes among different classes, the causes of which must be sought in the special environment of society for that time; and so far as administrative agencies can control that environment, to a large degree the question becomes one of criminal hygiene, with which the State has to do as a duty. Now, while in the present condition of knowledge, conditions and theories of this character are mainly speculative, so far as their practical application to government is concerned, they are mandatory upon government for prevention whenever they are sufficiently understood to be easily controlled. What is merely speculative to-day will, in ten years, be practical, and may in one hundred years become ordinarily functional elements in the regulation of every-day life. Great progress has been made in the past century, especially in prison discipline, the classification of crime and gradation of punishments, establishment of reformatory instructions for the young, and in the treatment of the insane. The crowded tenements of cities were the spawning grounds of crime; and here the question becomes one of moral disease and its prevention.

While modern thought, as it delights to call itself, seems committed to the idea that the interferance of the State in matters which it is pleased to call merely subjects of speculative administration is wholly misplaced and usurpatory, the consoling fact remains that science, little by little, is possessing itself of the adminisirative functions of society. Among the questions pressing for solution are few more practical in their character than this one, which demands from lawyer and physician their best efforts to ascertain the boundary line which divides wicked and punishable transgressions from those acts which are as truly the results of disease as the struggles of a madman in his bonds.

HYGIENE OF THE DEAF, DUMB AND BLIND.

J. L. Noyes, superintendent of the State Institution for the Deaf, Dumb and Blind, not having received sufficient notice, con-

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fined himself to a few facts regarding their sanitary condition. The average daily attendance in the institution for the first ten years of its existence was about fifty; for the past eight and one-half years, one hundred. There are now one hundred and ten deaf and dumb, twenty-six blind, and twenty-two in the imbecile department; total, one hundred and fifty-eight. All are now in good health, and this is generally the case, though the condition and vigor of these children is low, compared with others, as the disease depriving them of sight or speech leaves the body feeble and unable to resist disease. Some physicians assert that the deaf and dumb and blind are more susceptible to endemics and consumption, and shorter-lived than other children. During the first thirteen years there was no death in the institution, with an average attendance of over fifty.

Many seasons it is without more sickness than often occurs in a family of five to seven persons. But two deaths have taken place since 1863, and those under peculiar circumstances—the first case being that of a girl with a malformation at the base of the brain, that was injured by a fall, resulting in death; the other, a child violently attacked with croupal diphtheria thirty-six hours after entering the institution and dying in three days. There were no other cases following, and it was evident the disease was contracted before entrance. Girls and boys are subjected to the same regimen and observe the same hours; and the girls fully equal the boys in health. During their stay in the institution both sexes improve in health, and leave in better physical condition than they enter. The reasons for these favorable results were given, as follows: Regular habits, abundant and wholesome food, pure water, plenty of sleep in comfortable, well ventilated, sunny rooms, and daily exercise in the open air. Special pains had been taken with the water supply, and the State board had rendered efficient aid in the matter. All the pupils were required to work three or four hours per day (Sunday excepted) at various trades; five to six hours daily were devoted to study; the change from study to work being a decided benefit to the pupils, who rarely left on account of poor health—such cases averaging less than one in three years. Recreation was various and systematically arranged. "Thus the day passes with a pleasing variety of study, work and recreation, all systematically arranged, and habits of thought, regularity and industry are acquired, which are of great value in after life. Parents often speak of this, and one father declared he wished more of his

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children were deaf and dumb, that they might enjoy the benefits of the institution at Faribault."

Prof. Noyes also stated that cerebro spinal meningitis, or spotted fever, now stood at the head of causes of deaf-muteness and blindness; though scarlet fever had occupied that place until recently, and that children generally came to them ignorant of all sanitary principles. Rev. J. H. Riheldaffer next read a paper upon

HYGIENE AT THE REFORM SCHOOL.

The health of the inmates was far above the average. This was the result of the following conditions: The first step with new inmates was to wash them and put them in clean clothes; as they generally came to the school dirty, ragged and infested with vermin; second, regularity in habits, amusements and labor; the boys lead an active, joyous life of study, work and play, which was highly conducive to health. It was the aim of the discipline to restrain the youth from their evil habits and make the mind healthy as well as the body. Wholesome food and pure water were most important factors in producing these results. The water supply some years since had been unsatisfactory, and a well 150 feet deep was sunk in the solid rock; and this had undoubtedly saved the school from much disease. Seasons of pleasureable excitement, including the holidays, occasional entertainment, and a week's annual encampment on the danks of a lake, some miles distant, were among these reasons. The boys were kept in a healthful frame of mind as well as body. The reform school was a healthful institution. The speaker closed with the expression of the belief that the progress of sanitary science was not only improving the health of the race, but increasing its longevity.

The secretary stated that Dr. Bartlett, superintendent of hospital for insane, of St. Peter, had intended to be present, but his duties were so onerous that he was unable to attend. Dr. Bowers, superintendent of insane hospital, of Rochester, was in attendance, but circumstances had prevented his preparing a paper.

COTTAGE HOSPITALS FOR THE INSANE.

Dr. C. H. Boardman, of St. Paul, read an interesting paper on the Cottage Hospitals for the Insane, in which he combatted the policy of building large and costly edifices, in which are confined all classes of the insane, curable and incurable alike, without discrimination, and asked, as an economic question, whether

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it was wise to continue a lavish expenditure for the benefit of a single class. He said:

In 1877 there were about 45,000 insane persons in the United States, and of these about 90 per cent. were cared for in buildings provided either by taxation or by charitable endowment. Some idea of the significance of these facts may be derived from the statement that between 1867 and 1877, there were erected, in various States, twenty hospitals for the insane, whose capacity was sufficient for 9,758 patients, and the aggregate cost of which was $19,506,000. This is an average cost of $1,993 per patient, contrasted with which is the statement of the lunacy commissioners of Great Britain, according to whom the maximum cost of asylums in that country is £150 per patient, or $850, inclusive of land and furniture. The record of our State in this respect is better than that of most others, but the number of the insane seeking relief is increasing relatively to the growth of the population, and it is well that timely provision should be made to meet the difficulty, and that the mistakes of others should be corrected. If experience had shown that our system results in a larger proportion of cures than any other, no objection should be made to it; but of this there are grave doubts. The results obtained in this country are less favorable than those reported from abroad, where different methods are in vogue, and one is forced to the conclusion that there must be some grave defects in our machinery. One of these seems to be that we make thé same institution an asylum and a hospital. If our costly appliances are essential to the successful treatment of acute cases of insanity, which is denied on good authority, it does not follow that they are also necessary for the cure of the chronic and incurables, who might otherwise be cared for at much less expense and with equal advantage to themselves. Another defect is the multiplication of the duties of the superintendents of our asylums. It cannot be expected that they can devote that careful personal attention to the patients which is desirable while they are burdened with the conduct of a great institution in all its details; the cooking, heating, washing, ventilation and baking, as well as the farm operations. The superintendents of our own asylums are deserving of the highest commendation for their faithfulness and efficiency, for accomplishing so much in spite of a vicious system. A remedy for these and other evils which might be mentioned, seems to be the abandonment of further outlay for large hospitals, and the adoption in their place of the comparativcly inexpensive cottage system; the advocacy of which does not rest upon hypothetical considerations since their efficacy has been tested and established. Its greater economy has been referred to. Another argument in its favor is its incomparably greater safety in case of fire. It is of value also as a therapeutic measure, as it not only permits but invites an open air life to a much greater extent than is possible under the existing system; and this will lead, it is hoped, to the introduction of employment for the patients, which is regarded in foreign hospitals as a means of treatment of the highest value.

It would seem to be an act of humanity as well as a sound hygienic measure to supply these unfortunates with some occupation as far as possible, instead of permitting them to spend months and even years in wandering aimlessly about corridors or sitting idly with folded hands, the monotony of their existance broken only by an occasional walk when permitted by the weather. The infrefrequency of the use of restraining apparatus for the insane in English hospitals,

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seems due in a great measure to the treatment here advocated, since such sources of irritation as close confinement and enforced idleness are to a great extent removed. In conclusion, the system in question is urged, because expensive structures involve in addition to the original outlay a large annual expenditure for repairs and a greater cost of living than would be incurred in less pretentious buildings, and because of the large number of the insane to be provided for, who are but one of the dependent classes demanding public aid; and undue cost of maintenance of any one class is an injustice to all the others. It will provide for them more easily than can be done in any other way, various kinds of useful labor adapted to their tastes, strength or capacity, in order to relieve their morbid states of mind by drawing their attention away from themselves and fixing it upon the labor in which they engage, and at the same time giving tone and vigor to the body and control over their actions and mental processes, and thus aiding to restore the nerves and brain to their normal condition. It will enable the patients to pass the day in open air, or in shops well ventilated, freeing them from the oppressive monotony of confinement within the walls of a building, with only scant opportunities for exercises; and at the same time it will afford a degree of safety in case of fire which is unattainable under the existing system.

And, finally, it may be stated that the earnings of labor would reduce to some extent the outlay for current expenses.

THE COTTAGE SYSTEM DISCUSSED.

Dr. Bowers was not prepared for a speech, and did not feel like controverting the previous speaker. But the questions put to him in the general discussion which followed, elicited the fact that he thought the cottage system impracticable and extravagant, and was opposed to it. A number of interesting facts and figures were brought out by the debate, the general drift of which seemed to support Dr. Bowers' views. Dr. Sheardown, of Winona, member of the legislature, said he had been in favor of the cottage plan, but investigation had altered his views upon the matter. He doubted if it were adapted to this section and climate. This view was endorsed by other medical gentlemen, who had had occasion to study the matter.

At 10 o'clock the council adjourned, to meet this morning at 10 o'clock.

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THURSDAY, FEBRUARY 17.

MORNING SESSION.

Ex-Gov. Marshall presided.

Prayer by Rev. D. R. Breed, of St. Paul.

Dr. Evans, formerly health officer of Minneapolis, read a paper upon the difficulties in the way of health officers in large cities. These he divided into five classes, the first of which was the lack of appreciation on the part of the public, of the condition necessary to health. Many families who spent large amounts on wall paper and furniture would consider an outlay for ventilation and drainage an extravagance. If the health officer called attention to these things: if he tried to prevent the sale of adulterated or stale food; if he enforced quarantine or placarded an infected house, or advised the non-attendance of children at school, he was considered officious and meddlesome. The public generally seemed to regard health officers as conveniences; and the most common demand upon them was to regulate the condition of a neighbor's premises, abolish a woodpile or an unsightly fence.

Second—Empiricism. Quacks were doing much harm by instilling false notions of sanitation, and it was hoped the legislature would afford some relief in this particular.

Third—Lack of Co-operation of State and City Authorities—The legislature seems indifferent to the question, and city councils refuse to pass needed legislation. Streets and alley are used as dumping-grounds by property owners, who fill their lots with buildings, and the authorities do not interfere with them. The remedy suggested was a State board, with local boards responsible to it, all working together, and untrammeled by boundary lines.

Fourth—The expense of putting a place in proper sanitary condition, and of securing a good water supply. The latter should be the first thing seen to, regardless of cost; proper sewerage was the next thing.

Fifth—The pay of health officers was too small to admit of a proper performance of their duties. In Minneapolis the salary was $400 per annum—about a fair compensation for a clerk to do the writing needed in connection with the office; whereas the officer's whole time should be given to his work.

The doctor concluded by stating that he should be glad to see the time when health was as highly valued as wealth.

Dr. Mattocks, formerly health officer of St. Paul, said Dr. Evans' experience was much the same as his own. Something should be

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done, however, by way of educating officials and people up to caring for health. This would be slow work, and it wonld not be judicious to crowd matters too fast. As it was, people should exercise common sense. Filth was filth, wherever you find it, and the first thing was to get rid of it.

Mr. McClung, of St. Paul, thought that ventilation was greatly neglected; that more people died in this city from bad ventilation than from filth; and advocated dissemination of information on this subject by the faculty. Health was made a third or fourth rate matter in most cities; councils treated the question as the legislature treats the question of a dog law—with levity and derision; this city would be frightened at a proposition to expend $5,000 or $10,000 per annum on cleansing the city. There was a regular slaughter of the innocents here every summer, and 200 or 300 doctors more than necessary. He advocated reform in the board of health system, and hoped St. Paul would soon have one composed principally of physicians, and independent of the council.

Dr. Hewitt thought that was the point. Boards of health should be permanent and independent, constantly looking after sewerage, water supply and nuisances. Their office was to prevent disease, not to wait for its appearance. The evils of the present system were worse in the country than in the cities. Reorganization was necessary, and the remedy lay with the legislature. For the benefit of those ignorant of the law, he stated that the State board of health had the right to go anywhere and organize quarantine, if the local boards refused to act. Diphtheria was alarmingly on thei n-crease, and in 1879, more than ten per cent. of the deaths in Minnesota occurred from this one cause. The people, and even the profession, were slow to understand that this terrible scourge was contagious. To facilitate discussion, the circular of the State board on the subject was distributed.

The following report by Dr. Franklin Staples, of Winona, member of the State board of health, and chairman of its committee on diphtheria, is practically an abstract of his regular report, which appears in another place, but the subject is so important that little apology is necessary for its introduction here.

Dr. Staples read the following paper on Diphtheria in Minnesota —Its Relation to Public Health and Sanitary Science.

The State board of health of Minnesota, in its sanitary work for the past four years, has not failed to recognize the importance of diphtheria in its relation to public health. Observation has established the following facts:

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I. Diphtheria is increasing, not only in our own State, but in nearly all the northern Statesof our country, if not in the severity of individual cases and particular epidemics, certainly in general prevalence. The largest number of deaths from any one cause in the State of Minnesota during the year 1879, was from diphtheria, being upwards of thirteen per cent. of the whole number of deaths from all causes.

II. The disease is, to a great extent at least, preventable by sanitary means.

During the past four years a special committee of the board has had this work in charge. This committee has had the aid and co-operation of all the members of the board. The assistance of over 200 correspondents, mostly physicians, residing in all parts of the State, has been obtained. From these correspondents, during the time mentioned, over 300 letters and reports have been received.

The report of the board for 1878, made to the legislature two years ago, contains a summary of observations made concerning diphtheria in the State up to that time. The whole issue of that report at the disposal of the board was distributed throughout the State as judiciously as possible. Besides the official reports of the board, a circular on diphtheria, containing suggestions concerning its restriction and prevention, published in pamphlet form, was issued during the past year in an edition of 10,000 copies, and distributed especially to localities where the disease was known to prevail. Some of the newspapers of the State have kindly aided in disseminating the matter contained in this circular.

In addition to the work of the board in the way of correspondence and in the distribution of printed matter, the secretary of the board and other members in several instances have visited infected places, and have conferred with physicians and local health officers concerning sanitary measures, etc.

The analysis of water taken from various sources of the water supply of towns where diphtheria has prevailed, which has been done during the past two years in the laboratory of the board, has been an important part of our investigation concerning disease cause.

Our last circular of inquiry sent to correspondents during the past autumn called for information upon the following points, viz.:

First—The prevalence or non-prevalence of diphtheria in a given locality for the past year, beginniag about the 1st of November, 1879, to November 1st, 1880.

Second—Its forms and degrees of malignancy.

Third—Its apparent causes and means of propagation—expressly noting the relations of the disease to water supply and sanitary surroundings.

Fourth—The means employed for its prevention.

One hundred replies have been received to this circular.

By this study we have been able to confirm many points of doctrine now generally understood concerning this disease, and by observing its behavior on our soil, in our climate, and among the people of the various nationalities of our State, we have been able to arrive at some conclusions as to the kind of sanitary work demanded.

An important error has existed, not less, perhaps, in the popular notion than in professional opinion, which has perplexed and in a manner hindered sanitary work for the prevention of diphtheria. I allude to the general impression, or ill-defined opinion, that there exists, if only it could be found, a universal and specific cause of diphtheria. We know that diphtheria, like all other zymotic diseases, whether existing in the form of a malignant epidemic or as a sporadic

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disease, may be due to a variety of causes. This we have learned by observation, rather than by speculation. Favoring conditions, single or united, may become active causes.

First—Diphtheria is a contagious and infectious disease.

A child comes home from school with a sore throat; the next day it is found to be sick with diphtheria, and in a few days the whole family of children come down, one after the other, with the disease. A direct contagion was received by the child at school, and from this one by the other children at home. Again, the mother of a family nurses sick children in a neighboring family, or attends the funeral of a child dead from diphtheria. She may not have the disease herself, but in three or four days her children are sick with diphtheria. They have contracted the disease from an infection brought to them from the home of sickness or of death in the clothing or about the person of the mother. In both of these instances something more was required for the extension of the disease than the existence of the contagious principle in the breath of the child, in one case, or the clothing of the mother in the other, viz.: a susceptibility to the influence of the contagion on the part of those to whom the disease was communicated. The seed of contagion had to find its favoring soil in the bodies of those who thus developed the disease. These families lived in good circumstances, and with good sanitary surroundings, yet the members became victims to the disease thus introduced, and some of them died. There was in them a physiological tendency to receive and appropriate the infection. In other families that tendency might not exist in sufficient degree to allow the development of the disease.

Now, as the result of observation, we know that if these families, with the contagion of diphtheria thus brought to them, and having in themselves a susceptibility to the disease, instead of living in the observance of hygienic laws, and in the midst of good sanitary surroundings, had at the same time been subjected to the evil influence of bad air, impure water and unwholesome food, the destructive power of the disease would have been greatly increased.

The practical question now is, to what extent are the causes of disease in cases like these preventable? I have given a description of actual cases occurring every day in the State.

First—Good regulations, rigidly enforced, would render the chances for children to contract diphtheria far less than is the case at the present time.

Second—Every intelligent person in the State should be so instructed and impressed that no one should be allowed to nurse cases of diphtheria and go directly from the infected house into the presence of a family of children. There should be no public funeral in case of death from diphtheria.

Third—The insanitary conditions of air, water and food, which not only intensify zymotic disease, but are often the special causes of the same, are in a great measure remedial.

Fourth—If good sanitary regulations were rigidly and generally enforced, and hygienic laws observed, may we not suppose individual susceptibility to disease, especially of the zymotic classes, would be greatly lessened among all classes?

Secondly—Diphtheria often originates sporadically from the operation of various external causes. These are of greater variety than and not limited to what are usually denominated filth causes. It is a disease principally of the north temperate zone. Its history in ancient and modern times and different countries

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shows that there have been far-reaching and long-continued epidemic influences which have been independent of local causes. This is evident from the fact that diphtheria has at different periods invaded whole countries, in different parts of which it has existed with varying degrees of malignity for many years, then to disappear, leaving these countries entirely exempt from the disease for long periods.

There are, however, many tangible and accessible causes of the disease, and it is these with which, as sanitarians, we have to do.

Cold and damp air in and around dwellings—decaying floors, sills and foundations of houses—decaying vegetable matters in cellars under living rooms, are among the most common of the apparent causes of diphtheria.

It has been found that the hillside in valleys, about where the springs of water flow out from the strata of clay or rock, is unfavorable for the location of residences. This is true of any place where there is a liability to soil saturation on account of an underlying strata of clay or rock.

IMPURE WATER.

While typhoid fever is known to result from water impurities of animal origin, such as are found, for instance, in wells which receive the leachings from defective sewers and from privies. diphtheria is often caused by water rendered impure by decomposed vegetable matter. Surface wells, whose water holds the immediate leachings of the soil, and wells with old, decaying wooden curbing are the most objectionable. The water of a well that has held the body of a dead cat for weeks may make one sick, especially after the fact comes to be known; but it is not so likely to cause diphtheria as that from another well, whose water may seem to be quite pure, although containing the products of vegetable decomposition in abundance.

IMPURE AIR IN CLOSE DWELLINGS.

Here is a picture; reporter to State board of health says: "I visited a family (Norwegian) twenty-two miles north of this place (a village in Kandiyohi county); two of the children had died of diphtheria a week before. Their bodies had been put in a box in a small woodshed adjoining the house, and were still there; another child died in a few hours after my arrival, and the other two—there were five in all—in a few days. The father had the disease, but recovered. My single visit was the only one made by any physician to the family. These people hardly ever do anything for relief until one or two of the family are dead, and a common practice among them then is this: When a patient has been prescribed for by a physician, several families will obtain the prescription, or some of the medicine, and depend upon it alone.

"I asked these people why they did not bury the bodies of the dead children. They said they would wait and bury them all together when all were dead. There was only one room in the house, and no cellar. The family all ate, slept and kept their provisions in the small room. There were no means of ventilation, except by opening the door or a window. The atmosphere was so thick you could cut it with a knife. The children had their clothes on when in bed. The principal food was milk, kept, of course, in the same room."

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In reviewing this brief sketch of a single prevailing disease of our State, we are unavoidably impressed with the importance of some system of continuous sanitary work, which shall be made effective throughout the whole extent of our commonwealth.

A SUCCESSFUL FIGHT AGAINST DIPHTHERIA.

Dr. Hewitt was happy to announce a paper by a village health officer—one who had made a gallant fight with diphtheria, and crushed it out by the application of law. He introduced Dr. A. T. Conley, of Cannon Falls, who read the following statement of his experience:

THE STORY OF A SUCCESSFUL ATTEMPT TO CRUSH OUT DIPHTHERIA BY A LOCAL BOARD OF HEALAH.

Cannon Falls, Goodhue county, Minnesota, is a village of something over one thousand inhabitants, and the first board of health it ever had was appointed by the village council last June, consisting of three men who had never had any practical experience. But the diphtheria was raging only three miles away in a Swede neighborhood, an epidemic and malignant type. The people of the village were alarmed, and the council, to quiet their fears, took out a life-insurance policy—in other words, appointed a local board of health—and the board, feeling the responsibility resting upon it, determined to do something, and, inspired with the idea that the first and last duty of a health board was to order a general cleaning up, or cleaning out, they at once set themselves about it, and manure-piles, hog-pens, privies, back-yards, cellars and sewerage drainage were moved, cleaned, hoed, scraped and disinfected. After all this was done, the board and people rested and breathed easier. For is not diphtheria a filth-disease, and as the filth had moved out, how could the diphtheria move in? But it did move in, nevertheless, and, ah, then there was a gathering in hot haste on the street corners, and at the postoffice, and other public places of resort, and the board was appealed to, to know what to do next. The board did not know, and so after due deliberation concluded to call on the higher powers, and so sent for the secretary of the State board of health. Well, he came and met a good number of the leading citizens. At his suggestion the board was increased to six members, also a sanitary committee of six were appointed to work under the directions of the board. These men were appointed from among the best citizens, and here I stop to make a point:

All local boards should be representative men, and all ready to work together and full of energy. Then, to start on, you have the confidence of the people. Nothing can be done without order and harmony. The secretary of the State Board also impressed the people with the contagiousness of the disease, and advised strict quarantine.

So now the local board brought the local press into use, and a good list of rules and regulations were printed, and together with the State Board's circular on diphtheria, were scattered broadcast through the town.

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On the 15th of October a little girl came down, in school, with diphtheria, and was kept in school all day. The result was that, in less than a week, eight cases resulted from exposure to this case. Among the children, in five other departments, not one was attacked. The schools were at once closed and public gatherings of all kinds prohibited, including funerals and all church services.

And here was the first stone on which there was a split.

There are six churches in town. All gladly and at once submitted except one. The pastor of this church fell back on the old idea that disease and death are the direct visitation of God's wrath to punish for sin, and to bring the people back to repentance. Therefore, the best thing to be done was to meet in the churches and call upon God for forgiveness of sins and deliverance from the plague. One of the board succumbed to this idea, and when the vote was taken, voted to close everything but the churches. He wished it recorded and printed in the proceedings that he voted "no" on this resolution.

There was much talk about testing the law, whether the board were not going beyond their prescribed authority. But the other five members stood firm, printed the resolution with the law defining the powers of the board of health below it, and this was posted on the church door, and finally good advice and sense obtained, and the church remained closed until some weeks after the epidemic disappeared.

The sanitary committee visited every house in town, examined into all sources of filth, and reported regularly to the board. Strict quarantine was enforced in every family where the disease existed. A red card with "Diphtheria!" printed on it was posted on every house. No person was allowed to visit such house except physician and nurse. At the suggestion of the board a man was hired by the council to visi each house several times a day, never going farther than the door, and take orders for medicine and groceries, or whatever the family needed.

Whenever possible, all persons sick with the disease were removed to upper rooms. Persons were not allowed to leave the house without changing their clothing, and after the disease subsided, the most thorough cleaning and disinfecting was enforced.

The board found from the first, that a large proportion of the people had no definite idea that the disease was contagious, in fact, some of the physicians took the same ground. The sanitary committee were instructed in their visits to always make this idea prominent, and to furnish all with the rules and regulations of the board, and not only were the families where the disease existed, quarantined, but all children were kept strictly at home. Out of the fifty-five cases in town, in no instance did any child take the disease, where this rule was not violated, and here I wish to make this point: I have taken pains to inquire into every case, and I did not find a case that could not be accounted for on the hypothesis of contagion, and I believe only by these strict rules of quarantine were we able to crush it out.

While there may be such a thing as spontaneous diphtheria, and while common decency would require the removal of filth, yet, as far as my experience goes, the germ or cause of diphtheria does not originate in filth. But that diphtheria is as contagious as small pox to children under twelve years of age, whether vigorous or sickly, clean or dirty, is my settled conviction; at least, I am positive it was so in our epidemic.

It has taken the world thousands of years to begin to learn that national difficulties can be a great deal better settled by arbitration than by an appeal to

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arms. War is a disease that feeds on the very vitals of a nation and often results in national death. Arbitration is a sanitary measure. And so, likewise, after thousands of years the people are beginning to realize that wise sanitary measures will preserve the health of the people better than an army of doctors with their munition of war—drugs.

The doctor related the case of a young lady who had helped a family where the disease had been present to clean up, and did not come down herself, but on going home communicated the disease to several of her family. He recounted the manner of disinfecting after deaths or recovery; thorough fumigation with sulphur, boiling of cotton goods, exposure of woolen goods to fumigation and fresh air, and the burning of all unimportant articles.

OTHER EXPERIENCES.

Dr. Hewitt related an instance where a father and mother had attended a party in a distant town, from which the disease had just disappeared, and brought back the contagion to their child, the case resulting fatally in three or four days.

Dr. M. V. Hunt, of Waseca, Waseca county, said:

That diphtheria may be contracted by contact and by clothing after months, is shown by the cases here reported. A young lady, twenty years of age, who, while attending the normal school at Mankato, had diphtheria in the malignant form. Her dresses, cloaks and wraps were hanging on hooks in the sick room. While convalescing, the clothing was placed in a trunk and brought to our county, two miles from the village. This clothing was not disturbed for over nine months. Then the young lady desiring to reform some of the old dresses, took them from the trunk. Seven days after, five children in the house came down with diphtheria and one died. Mr. V., an engineer employed on the Chicago & Northwestern Railroad, running between Waseca and Sleepy Eye, visited families while in trouble with the disease, came home and in thirteen days one child came down with the disease and died. All of the family, including the father, had the trouble in a degree. By caution and a rigid quarantine the disease was here checked. This is the only family having the dread disease in the corporate limits of our village. In a house in the county where they have or have had diphtheria, I recommend the use of black oxyde of manganese and muriatic acid, which, by chemical combination, form chlorine gas, and makes one of the best disinfectant agents known.

Dr. Staples said the diphtheria poison was a heavy contagion, far more likely to be communicated in clothing than by the breath, and gave additional instances as to its retention in clothing and walls of houses. He had no doubt, however, that it could be communicated by the breath.

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Mr. Schofield, of Cannon Falls, a member of the sanitary committee, of that village, said every idea they had previously had in regard to diphtheria seemed refuted by their late experience. The parts of the town generally least afflicted by malarial diseases were most subject to this scourge.

In portions of the town where there was the most filth there was but one case; while the cleanliest and most refined people in the town suffered as much as those who were careless. The trouble was in free inter-communication. In the country everybody knew everybody, and when any one was sick, everybody in the neighborhood rushed in to see him—and in the country the disease was worst. Quarantine was the thing.

Dr. Wedge said that diphtheria was the most tenacious poison known; convalescent patients would communicate the disease. Too much care could not be used.

Mr. Schofield thought the public schools should not be reopened for three or four months after the disease had been apparently eradicated.

Rev. Dr. Thomas read a letter from Bishop Whipple expressing warm sympathy and interest in the work of the council, dwelling upon the sacredness of the body as the temple of the soul, and invoking the divine blessing upon their labors.

Adjourned until 2 p. m.

AFTERNOON SESSION.

The first paper read was by Rev. R. H. Sample, of Minneapolis, upon the Hygiene of the home.

The home. he said, should be especially guarded from the invasion of disease yet here is often found its origin and stronghold. Special stress was laid upon cleanliness of the person—keeping the pores open. Obstructions of these may occur as readily or more so in the case of those who live in luxurious abodes as those who labor in shops and kitchens. Regular and thorough ablutions were urged, but too frequent cold baths were discouraged. The subject of ventilation was dwelt upon at length, and the deleterious effects of illuminating gas shown. Headache, neuralgia, indigestion, cutaneous disorders, etc., were often due to this cause alone. When these grew into more serious diseases and terminated fatally, the result was not to be attributed to the dispensations of a mysterious Providence, but to our own negligence. The use of open fires was recommended, and carpets and heavy curtains, those allies of disease, condemned The influence of light upon disease, the matter of house plants, etc., were noticed. Especial caution was urged in regard to contagious diseases, the speaker coinciding fully with the views expressed by the physicians at the morning ses-

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sion. It is a blessing and a duty to live. We are criminal if by neglect of the laws of nature we shorten our lives or those of our families.

A LOCAL RESOLUTION.

The following resolution was unanimously adopted, and Dr. Sheardown was requested to take charge of it and introduce it to the notice of the House:

WHEREAS, A bill is now before the Legislature, which contemplates the making the city physician of Minneapolis also the health officer, be it

Resolved, That the council now in session express hereby their decidcd conviction that the best interests of the community demand that these offices be kept separate and distinct; that local boards of health should always be separate in their functions from other municipal interests: and that such boards should be composed of gentlemen, whether physicians or others, who manifest an active interest in all matters coming within their jurisdiction.

NOTE.—The two offices were combined, despite the protest, giving too much work and too little pay for any one man, as a trial will prove.

FURTHER DISCUSSION ON DIPHTHERIA.

The discussion upon diphtheria was resumed, and Dr. Berry of New Ulm, gave some illustrations of its contagiousness. The first was one of contagion from sleeping in a contaminated house; the second resulting from one single case in a Swedish settlement, where the Lutheran clergy regarded it as a dispensation of Providence, insisted upon holding public funerals. The consequence was that two-thirds of the children in that settlement died. The German and Norwegian clergy co-operated with the doctor in his efforts, and isolated their flocks, who almost wholly escaped the disease. The railroads seemed to act as agents in transmitting the contagion. In two days' time he had forty-three malignant cases. In regard to cleanliness, he stated that at one time he had twenty cases which he felt sure would result fatally; that night a heavy rain-storm came. As a result every case improved, and most of them recovered. The public schools had been kept open most of the time, against his advice, and the result was that New Ulm has not been without diphtheria from that day to this, 99 per cent. of the cases being directly traceable to the schools. Dr. Berry advised his clients to keep their children away from school, and all of them did so but one—Capt. Bobleter. His children went to school and the result was five cases of the epidemic in his family. A sewing girl employed in his family for a day or two, was sent

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away by the doctor. She slept with her little brother and communicated the contagion to him. A lady who had assisted a friend in nursing her family, sick with diphtheria, and on burying the dead, went home eighteen miles distant, caressed her little ones, kissed them—and communicated the contagion; in ten days they were all dead. A number of other cases were given, all enforcing the same lessons.

Dr. Hewitt said the object in calling this testimony was to correct the illusions of those who regarded the State Board of Health as theorists, and contended that diphtheria was not contagious. He therefore put witnesses on the stand whose evidence could not be questioned.

Dr. Davis, of Mankato, thought much of the virulence of the plague at that place was due to keeping the schools open. It was the impression at first that the original cases were indigenous, but investigation showed it had been transmitted from abroad. He too, gave a number of instances to prove the contagiousness of the disease. Diphtheria was not a filth disease, though filth and foul water were factors in its action. He thought it more like smallpox than any other of the zymotic diseases. Ulcerated sore throat was frequently mistaken for diphtheria, hence many of the supposed wonderful cures. Quarantine was the best treatment—there was no other specific. He thought it likely that inoculation might soon be successfully practiced in treating this disease.

THE Y. M. C. A. SANITARY WORK.

Mr. D. R. Noyes read an interesting paper upon the sanitary influence of the Young Men's Christian Associations. Physical condition has always received much attention from the associations. Care for the sick and work as Howard associations have formed a prominent feature in their work. There is no grander feature in history than the services of these associations on the battle-fields of the late war and in the plague-stricken cities of the South. The associations had worked in various other minor ways—by attendance in hospitals and the provision of free baths in the large cities, as well as by the restraining influence upon the young, preserving them from the poisonous influences of vice and intemperance. Gymnasiums had been established, and muscular christianity fostered. Their railroad work was noticed, and its consequences shown; their influence upon the criminal classes and the impor-

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tance of its extension urged. The associations were ever on the watch to rescue even the depraved from disease and death.

Dr. Hagan thought diphtheria sometimes sprung from filth alone, and gave instances in support of his views. The board had not finished its work when it said it was propagated by contagion.

In response to a question several physicians stated that in some cases, patients had the disease twice, and even (in one case) three times.

Dr. Hewitt could not agree with Dr. Hagan, but thought the disease in present epidemic altogether a contagious one, at least it always spread in that way.

Pres. Folwell, of the State university, discussing what schools should do for hygiene, said universities could and should establish professorships of public health, and should do so before they establish medical colleges. At the State university Dr. Hewitt, as professor of public health, had delivered a few lectures on the subject, and the speaker only wished he could move the doctor to Minneapolis and enable him to devote his entire time to this work; there was a great work to be accomplished in this direction. The university hoped soon to secure a gymnasium, which he wished to have conducted on the system of in use at Yale, and which he thought would do much good. A thorough system of physical examinations was already begun. A skating rink was also proposed, and physical culture generally would, he hoped, receive more consideration. He thought labor in connection with study beneficial, if the student did not attempt to accomplish too much in a given time; if the old fashion of a four years' course were broken down, and the student given as much time as he wished to complete the course, twice as many men would work their way through college. If this were done and the Scotch system of commencing sessions late in the fall adopted, it would give the student opportunity to make his way without the excessive drain upon vital forces made by the present system.

Adjourned till 7:30.

EVENING SESSION.

At this, the final sitting of the council, James A. Dodge, Prof. of chemistry, of the State university, was the first speaker, his subject being the adulteration of food. He stated that he would confine his remarks to some of the more common articles of daily con-

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sumption. Commencing with sugar, he exhibited samples of pure and adulterated articles, giving tests for the detection of impurities. Vinegar, coffee, baking-powder, mustard, spices, etc., were handled in the same way, the lecture being illustrated by experiments.

Dr. Hewitt then treated at length of impurities in air and water. Half a dozen powerful microscopes were on the table near him, showing different forms of organic and inorganic matter contained in these two elements—specimens from St. Paul hospitals, containing some forty different substances, deleterious and otherwise—being among the number. During the lecture the fact was incidentally brought out that the water supply of St. Paul is among the best in the State, and that of Minneapolis fully up to the average of good river water. Wells in cities were condemned, and greater care advised in their construction and location everywhere. A large share of the time was devoted to bacteria and other living organic matter supposod to be concerned in producing the zymotic diseases.

Bishop Ireland closed the session with a few remarks expressing his sense of the value of the work done by the council, and that body adjourned sine die.

The meetings of the council increased in interest to the close. This method has proven to be a successful one, and will be continued hereafter at intervals of three or four months. The next one will be held at Albert Lea, Freeborn county, August 31st and September 1st, 1881.

Another will be held late in October or early in November, at Mankato, Blue Earth county.

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REPORT ON DIPHTHERIA.

BY FRANKLIN STAPLES, M. D., WINONA.

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DIPHTHERIA.

The report of this Board for 1878 contains a summary of the observations made concerning diphtheria in the State up to that time. The whole issue of that report at the disposal of the board was distributed as judiciously as possible throughout the State. Since the time of that report, the committee in charge of this work has continued its investigation, and is now able to submit the facts and observations contained in the present report. The committee has had the aid and co-operation of all the members of the Board in the prosecution of the work assigned it. It has also had the assistance of over two hundred correspondents, mostly physicians, residing in all parts of the State, who, at the expense of much time and labor, have kindly furnished most of the facts here presented. To these we desire to acknowledge our obligations. A list of correspondents, with their P. O. addresses, are given herewith.

In November, 1879, a circular letter was issued to correspondents, being an inquiry concerning the prevalence of diphtheria in the State from November 1st, 1878, to November 1st, 1879. To this circular one hundred and twenty-nine replies were received.

Our last circular of inquiry sent to correspondents during the autumn of 1880, called for information upon the following points, viz:

First—The prevalence or non-prevalence of diphtheria in a given locality for the year, beginning about the first of November, 1879, to November first, 1880.

Second—Its forms and degree of malignancy.

Third—Its apparent causes and means of propagation—expressly noting the relations of the disease to water supply and sanitary surroundings.

Fourth—The means employed for its prevention.

To this circular ninety-one replies were received.

Besides the official reports of the Board, a circular on diphtheria, containing suggestions concerning its restriction and prevention, published in pamphlet form, was issued during the past year in an edition of 10,000 copies, and distributed especially to localities where the disease was known to prevail. Some of the newspapers of the State have kindly aided in disseminating the matter contained in this circular.

(For circular on restriction and prevention of diphtheria, see appendix to this report).

In addition to the work of the Board in the way of correspondence and in the distribution of printed matter, the secretary of the Board and other members in several instances have visited infected places, and have conferred with physicians and local health officers concerning sanitary measures, etc.

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The analysis of water taken from various sources of the water supply of towns where diphtheria has prevailed, which has been done during the past two years in the laboratory of the Board, has been an important part of our investigation concerning disease cause.

By this study we have been able to confirm many points of doctrine now generally understood concerning this disease, and by observing its behavior on our soil, in our climate and among the people of the various nationalities of our State, we have been able tc arrive at some conclusions as to the kind of sanitary work demanded.

EXTRACTS FROM LOCAL REPORTS ON DIPHTHERIA IN MINNESOTA FOR THE TWO YEARS FROM NOVEMBER 1st, 1878, TO NOVEMBER 1st, 1880.

ANOKA COUNTY.

Pop., 6,979—*Whole No. of deaths in* 1879, 65—*Deaths from diphtheria*, 2.

ANOKA, 1880.—A case of diphtheria reported in a girl aged eighteen, occurred soon after cleaning out a cellar which had contained a large quantity of decomposing vegetable matter. The stench from the cellar was said to be very offensive.

A case occurred in a delicate child aged nine years. The well was found to be very foul.

BLUE EARTH COUNTY.

Pop. 22,885—*Total No. of deaths in* 1879, 426—*From diphtheria*, 184.

VERNON CENTRE, 1879.—Ten cases of diphtheria and three deaths occurred in this vicinity—all American. Concerning origin, reporter says:

"A girl living here, together with three other children from another town, was on a visit to Lake Crystal. A woman from Mankato, where the disease had prevailed extensively, was visiting at the same house, and was at the time suffering from a sore throat, which, however, was not very severe. In seven days the four children were taken with diphtheria. The girl returned home, and hers was the first of the ten cases. The other cases occurred among neighboring children who were in the house with her daily until the nature of the

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sickness became known. The houses of these families were poor, two of them were old log houses, and all except one were on low, flat ground—water poor in all except one—no analysis of water.

"In the management, the sick were isolated as completely as would have been done in case of small-pox.

"Should not think it safe for children to be allowed in rooms where diphtheria had been, for at least three months thereafter."

1880.—Reporter says: "Twenty-nine cases during the year, eight deaths. Contagion the greatest apparent cause. Cases also occurred without known exposure in some localities where sanitary surroundings were bad, houses poor and old, and where bad water from a slough was used. But other families were affected where the houses were good, standing on elevated ground, with clean cellars, pure water and with everything favorable in a hygienic point of view. All the families affected, save one, lived in or near the woods along the Blue Earth River."

STERLING, 1879.—Epidemic began about the middle of October—origin supposed to be importation of contagion—disease limited to a radius of about three miles—twelve deaths in perhaps forty cases—all Americans. The progress of the disease from house to house through this district was in a northerly direction, with the exception in case of one family residing to the southeast of the starting point. The reporter suggests that the disease might have been carried to that family by means of a buffalo over-coat, which was taken there from a house where a patient had died with diphtheria. The prevailing winds during the time were from the south. Nearly all the families affected lived near the Maple River, which stream had been lower this season than had been the case for a number of years. Most of the houses are frame structures and are in good condition. The banks of the river are high, and the country is a rolling prairie. Water is supplied by surface wells, with a single exception, where the water is from a spring, and here the disease began. The wells vary in depth from ten to twenty feet, and usually are but a short distance from the house or stable. The soil here is a loose black loam, with a depth from eighteen inches to three feet, overlying a clay subsoil.

BROWN COUNTY.

Pop. 11,853—*Total deaths in* 1879, 191—*From diphtheria*, 32.

NEW ULM, 1879.—From November 1st, 1878, to November 1st, 1879, diphtheria prevailed at New Ulm and in the country within a radius of twelve or fifteen miles. During the first six months of this time, only sporadic cases existed, but the latter half of the year witnessed a widespread epidemic.

The disease prevailed along the line of the Winona & St. Peter R. R. in the autumn of 1878 and of 1879. Population, German and Norwegian—one case in five fatal, estimated. Reporter observes that in his observation in this region, in many cases he found the disease where the sanitary surroundings seemed to be good and the water pure; and adds that his experience, both lately and in

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1862, when diphtheria prevailed in this region in a malignant form, has convinced him that the great cause of diphtheria is infection.

1880.—Disease began in September. Several fatal cases in a short time, afterward sporadic cases of a milder type. Scarlatina prevailed in November.

Along the valley of the Little Cottonwood River in Brown county, and in the adjoining county of Nicollet, in the towns of Lafayette, Courtland and Bernadotte and in the southern part of Sibley county, diphtheria prevailed to a great extent during the winter and spring of 1880. In November, 1880, a large number of cases occurred in the town of West Newton, and in the towns of Stark and Seigle, Brown county, a malignant form of the disease prevailed.

Reporter observes: "Nothing but the continued existence of the contagious principle all over this section of the State for several years past will account for the repeated outbreaks of diphtheria. In a great many instances the bad water supply and poor sanitary surroundings have assisted materially in developing the disease, as well as in rendering its form more malignant.

Sleepy Eye Lake, 1880.—Diphtheria began to prevail in this vicinity in a malignant form about the first of December, 1879, continued until April, 1880, in a continuous epidemic. There was then an abatement of the disease. From April first until the end of the year, 1880, sporadic cases occurred in the village and surrounding country. No locality, however good the sanitary surroundings, was exempt. Malignant cases were characterized by enormous swellings of the glands and muscles about the neck and face. Most of these cases died within three or four days from the beginning of the attack, while some lingered a week or ten days; death, in either case, resulting from blood poisoning and the consequent destruction of all vital force. The whole mucous surface of the throat and often that of the nasal passages was occupied by a dirty, tenacious, fibrinous exudation, the tongue was enormously swollen, the mouth could not be closed. Frequently a dark, thin and very offensive blood oozed, not only from the nose, but from the mucous membrane of the mouth and throat. The skin on various parts of the body showed a petechial eruption, while on the swollen neck and face, and about the eyes in some cases, there was extensive ecchymosis, as from contusion. The odor was intense, peculiar and sickening. The temperature of the body was rather high, 102, and the circulation rapid and feeble, 120 and upwards. The little patient died in a gradually increasing coma, or suddenly from failure of the heart's action.

In families where cases answering to the above description existed, there would frequently be others of a mild type. These, although apparently affected by the contagion, and having a marked and characteristic exudation, yet were without much odor of the breath, without much febrile action and made a rapid convalescence. It is nevertheless true that some of the unfortunate sequellæ of diphtheria, such as diphtheritic paralysis, have resulted in these milder cases.

The following history of the disease is illustrative:

Family, Scandinavian, living five miles east of Sleepy Eye Lake, eleven in family, three adults and eight children, small frame house, two small rooms and shed kitchen, cellar simply a hole under the house with air circulating through it from without, house placed low on the ground with some decay of sills and timber. The surface of the country is comparatively level. A few trees and a flat ravine are a few rods west of the house. The water was obtained from an open, wood-curbed, shallow well, which was nearly dry. Seven children were taken sick in the month of October within twenty-four hours. Five died, the four elder and the youngest; three within twenty-four hours of each other.

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CHISAGO COUNTY.

Pop. 7,997—*Total deaths in* 1879, 52—*From diphtheria*, 1.

TAYLOR'S FALLS. 1880.—Reporter says:

"In February five cases in one family four miles south of this place—cases malignant, three fatal; water supply from shallow well; family occupied a log house; sanitary condition bad; Scandinavian.

DAKOTA COUNTY.

Pop. 17,414—*Total deaths in* 1879, 156—*From diphtheria*, 18.

FARMINGTON, 1879.—Disease appeared here in August, in a farmer's family (American), supposed to have been introduced there by a servant girl who came into the family and who had had diphtheria shortly before coming. This was the beginning of quite a prevalence of the disease, mostly in American families, in every one of which the sanitary conditions and water supply were said to be good. It was confined to a limit of four miles square. Cases occurred both in the village and in the country, on high and low land. In some families cases were mild, in others three out of four children died. Isolation of cases was adopted as a means of prevention, and rooms and houses were thoroughly disinfected. Houses were not deemed safe for the admission of children at least for four months after the existence of the disease in them.

LAKEVILLE, 1879.—An epidemic in July and August, confined to four families. It was supposed to be introduced to one of the families by a visiting friend who came there with a sore throat. There was frequent intercommunication between these families and all the children had the disease—twenty-one cases and six deaths.

DODGE COUNTY

Pop. 11,413—*Total deaths in* 1879, 118—*From diphtheria*, 6.

CLAREMONT, 1879.—For five or six years previous to report made in autumn of 1879, only sporadic cases of diphtheria had occurred in this vicinity. Dodge county has been singularly free from any important prevalence of the disease. Reporter gives a case of malignant diphtheria beginning at a place a few miles distant, within the sphere of a severe epidemic, moved to a non-infected locality near Claremont, proved fatal, and two mild cases resulted in the same house. The hygienic surroundings were good, the public was excluded, disinfectants were used. No further extension of the disease occurred.

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1880.—Diphtheria prevailed as an epidemic in April. Of fifteen cases in the vicinity, two were Germans, three Americans, nine Irish and one Scotch—only three deaths. In all except two of the families the sanitary conditions were bad, the houses close, poorly ventilated and filthy. Decaying manure was found in close proximity to wells. This was especially noticeable in families in which fatal cases occurred.

DOUGLAS COUNTY.

Pop. 9,159—*Total deaths in* 1879, 81—*From diphtheria*, 10.

OSAKIS, 1880.—Reporter says: Sixteen cases, five fatal. Cause, water supply from an old, filthy well, and cellar under the house half full of water all summer.

FILLMORE COUNTY.

Pop. 27,125—*Total deaths in* 1879, 302—*From diphtheria*, 20.

CHATFIELD, 1879.—Several months since a girl twelve years old suffered from a severe attack of diphtheria. When convalescent, her brother two or three years younger came down with the disease and died. There had been no other cases of this disease in the village for several months. To a casual observer the premises were in good condition; "but," says the reporter, "while the external appearances were favorable, yet, on examination, it was found that the rear part of the house was so low that the base timbers were in contact with the ground and were in a decaying condition. There was no ventilation beneath the floor. Such a house in Memphis would help to propagate yellow fever; why not diphtheria in Minnesota?"

Malignant diphtheria began in the southeastern part of Fillmore county, in May, 1879. Mild sporadic cases had occurred in the vicinity during the winter. The malignant outbreak began suddenly—four fatal cases in one family, and in a short time several other fatal cases in same neighborhood—after which the epidemic continued in a milder form and cases recovered. Careful investigation failed to detect any unsanitary condition as a cause. In 1877 a severe epidemic visited Lenora and vicinity, this being from one to four miles distant from the region of the epidemic above described. The latter place at that time escaped. The sanitary condition is as good now as it was then. The water was from wells and cisterns, the buildings on high ground, nationality Scotch and Scandinavian.

Reporter gives the following history of diphtheria in the western part of Fillmore and the eastern part of Mower counties three years ago. The first cases oc-

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curred in this wise: An American family, consisting of father and mother and ten children, the oldest being seventeen years, all slept in one room in a small log house. All the children had diphtheria, and four died. A few other cases occurred in the neighborhood. From this place there is good reason to suppose it was carried to Spring Valley by visiting relatives. The first case there proved fatal. The disease was not regarded as contagious. A public funeral was held, at which a lady was present with two children. She lifted the children above the casket that they might view the remains. The lady and her two children were dead from diphtheria in less than two weeks. A severe and fatal epidemic followed. A lady from Spring Valley went on a visit to Austin, taking her two children with her. The children, previously exposed, were taken sick soon after reaching that place, and Austin was visited by a prevalence of diphtheria.

Concerning causes other than contagion, reporter says: "Decaying straw stacks near dwellings; wells into which surface drainage is allowed to run; old log houses and exceedingly filthy cellars."

CHATFIELD, 1880.—The disease has prevailed in the country, near and at some distance around Chatfield, and has been attended with considerable fatality. Its existence in the village seemed to be due to importation from the country. The first case in the village in 1880 occurred in this wise: A laborer residing here had been at work near the Missouri River, in Dakota His family had been with him there. In June the family returned, the wife being sick with the diphtheria. The results of this importation are given as follows; "The patient lived, I cannot say recovered; for she is yet unable to walk, and will undoubtedly die before a long time. Her brother, a sister of her husband, and two nieces, the daughters of another sister-in-law, all took the disease and died. A few other relatives, who were in and out during the time of their sickness, suffered from slight attacks, but recovered."

FREEBORN COUNTY.

Pop. 16,074—*Total deaths in* 1879, 205—*From diphtheria,* 30.

ALBERT LEA, 1879.—The city has suffered from only a few sporadic cases. It has a population of about 3,000, is mostly situated on a plateau elevated about 38 feet above the lakes by which it is almost surrounded. The soil is sandy, overlying a bed of gravel 35 feet deep. The plateau of the town contains about one-fourth of a section. Beyond this we come to land with a heavy clay soil, with a deep clay bed underlying. The first cases of diphtheria referred to in this report occurred in families living on the clay soil, with small sloughs to the south and west of them.

A child two years old was taken with what seemed to be membraneous croup, and died. Every person who had the care of this child was taken with diphtheria. They were the father and mother, a brother aged 12 and a sister aged 5, a nurse girl and two elderly ladies, neighbors. All were well marked cases of diphtheria. No fault could be found with the sanitary condition of the house.

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They are first-class housekeepers. The twin sister of the child who died of croup was taken away from the home as soon as the first child was taken sick, and was kept away until all were well and the house was thoroughly cleansed and disinfected. It was away from the home about six weeks, and remained well during all this time. When it was thought safe she was brought home, was taken sick on the third day, and died on the fifteenth after her arrival.

NOTE.—The history of diphtheria thus far in the State, has never given any important prevalence of the disease to any city or town, whose topography and geological surroundings are like what is given above for Albert Lea. A similar description and history will apply to Winona and Lake City.

GOODHUE COUNTY.

Pop. 29,505—*Total deaths in* 1879, 414—*From diphtheria*, 42.

RED WING, 1879.—Reporter gives, as coming under his observation from November 1st, 1878 to November 1st, 1879, eighty-eight cases; males, forty; females, forty-eight. Scandinavians, fifty-eight; Americans, fourteen; Germans, seven; English, seven; Irish, one; French, one. In these there were nineteen deaths; thirteen females, six males; sixteen Scandinavians, one German, two English. The oldest who died was fourteen years, a German, female. Of the eighty-eight cases, thirty had laryngeal diphtheria, either in the invasion of the disease or had it developed in the progress of the same, and the result in the thirty cases was nineteen deaths and eleven recoveries. The majority of the fatal cases were, in the onset, mild pharyngeal attacks, relapsing after early exposure, or were not properly cared for during the attack. The cases all occurred in the city, excepting four.

The situation in one locality is on a hillside facing the south. The drainage is good, and the water supply is from a well in the sand-rock. There is a privy above, but the soil is not very favorable for percolation. The water is apparently good——no analysis. All the houses have basements which are used as living rooms. In this locality, in an area of four hundred feet square, over twenty-five of the worst cases occurred, with eleven or twelve deaths.

In another bad locality with the slope towards the south and the Mississippi River, in old wooden buildings with basements, there were sixteen cases; and seven more occurred in one family living in a narrow *eul de sac* valley.

Reporter observes: "In my experience basement residences have been favorable for the development of diphtheria. In the locality near the railroad depot on Broadway in this city, a basement had been abandoned in August on account of diphtheria, and had remained so until November. Early in November a family came to town, repaired the basement so as to make it very comfortable, and moved in. The family consisted of the parents and two children. In about eight days the oldest child was taken sick with diphtheria; next the father and afterwards the mother, the youngest child escaping. The ventilation was poor, and the steam from the cooking penetrated the whole apartment, which was used as the cooking, living and sleeping room. When the disease gets into

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such quarters it stays, is endemic, is a part of the locality. The conditions which seem to be favorable to an abiding contagion are a cold, condensing surface, absence of sunlight and poor ventilation. Now, to these add over-heating in the day time, which atomizes the moist accumulations on the walls and clothing, and condensation again upon the same cold walls at night. Such conditions and processes seem to be favorable to the multiplication and activity of disease germs."

1880.—Diphtheria prevailed this year in this county mostly in a mild catarrhal form. In not more than twenty-five per cent. of the cases that might be considered diphtheritic, was there evidence of septicæmic poisoning, as shown by enlarged cervical glands, general prostration and a drowsy condition of the patient. In ten per cent. the trachea was involved, producing the croupous variety. Of this class at least sixty-five per cent. died. Three-fourths of all cases seen by reporter were Scandinavians. Most of the cases were in the country and seemed to originate independently of each other.

PINE ISLAND. 1879.—A few sporadic cases occurred in November and December, mostly American. Reporter observes: "As to the water supply, it was not good in any of the cases.

"A family was sick with diphtheria at Forest Mills, eight miles from Pine Island. A servant girl whose home was at Pine Island went to work in this family, was taken with the disease in two days, was sent home with her throat in a bad condition, but recovered. The short length of time for the development of the disease after the exposure will be noted in this instance.

1880.—Diphtheria prevailed at Pine Island and vicinity, beginning in December, 1879, and cases occurred in every month in the year 1880, except June and July. Many cases of simple pharyngitis; a few cases of true diphtheria; fatality very small.

CANNON FALLS, 1880.—About April 1st the first case in the late epidemic in this vicinity appeared in a Swedish neighborhood three miles from town. In the next seven months within a radius of two miles from this point there were seventy cases and twenty deaths. The first case is thought to have been caused by contagion from Northfield, and that the disease spread through this neighborhood by contagion, there is not a shadow of a doubt. The first case in the village was on the thirteenth of June. The disease spread slowly, only five cases occurring up to August 14th, when the children in two other families came down. School opened early in September, but the children from these families did not attend school for several weeks. On the fifteenth of October, a little girl came down in school, contracting the disease, as was supposed, from the children of the above mentioned families. In less than a week eight others had the disease, all children in the same department of school. Step by step it could be traced from family to family up to this time. Before the disease was crushed out, which was done by strict quarantine, fifty-five cases had resulted in the village, with twenty-two deaths, besides fifteen or twenty additional cases in other neighborhoods, accounted for every time by exposure to the disease either in town or country.

Out of the one hundred and forty or one hundred and forty-five cases in all within the knowledge of the reporter, only three were attacked who were over twenty years of age. These recovered. Not over eight or ten others were attacked who were over fourteen. In the most malignant cases, the patients died on the fifth or sixth day, seemingly overwhelmed by the virulence of the disease.

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There were only six cases of diphtheritic croup, of which only one recovered. The majority died at about the end of the second week from asthenia, and a few lingered until the end of the third week. There was always complete loss of appetite. The cervical glands were nearly always much swollen. Fever and vomiting were among the earlier symptoms. In cases that recovered, loss of voice and paralysis of the voluntary muscles of the throat was common.

HENNEPIN COUNTY.

Pop. 66,570—*Total deaths in* 1879, 933—*From diphtheria*, 54.

MINNEAPOLIS, 1879.—Diphtheria has not prevailed as an epidemic. The sporadic cases that have occurred have been reported along the river, and exceptionally in more elevated parts of the city with good surroundings.

The number of deaths from the disease in each month, from November 1st, 1878 to November 1st, 1879, were as follows: 1878: November, two; December, two; 1879, January, six; February, five; March, seven; April, two; May, ten; June, five; July, three; August, none; September, two; October, none; Total, forty-four.

Reporter observes: "The disease prevailed most in localities which are not well drained. It may be stated that typhoid fever has prevailed in the same localities. Where surface drainage has contaminated shallow wells, observation has shown that typhoid fever has resulted; while as to the production of diphtheria, we have not yet arrived at conclusions so satisfactory. While it appears in the monthly statements, the summary of which is given above, that no deaths occurred in the months of August and October, yet it was true that cases of the disease occurred in every month in the year.

1880.—As in the preceding year, no epidemic; yet no month has been without the disease unless possibly the month of June.

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Table showing deaths from diphtheria, from croup, and the total number of deaths in Mieneapolis, for each month from November 1st, 1879 to November 1st, 1880.

	Diphtheria	Croup.	Total.	All causes.	Per cent.
November	6	2	8	55	14.5
December	9	2	11	59	18.6
January	4	1	5	54	9.2
February	6	.....	6	55	10.9
March	5	1	6	58	10.3
April	1	1	2	38	5.2
May	7	1	8	49	16.3
June	.....	.....	.....	42	.....
July	1	.....	1	94	1.0
August	2	.....	2	84	2.3
September	3	.....	3	75	4.0
October	9	3	12	68	17.6
Total	53	11	64	731	8.7

A large proportion of the cases have been of the mildest catarrhal form. In fatal cases, death has oftenest resulted from exhaustion or blood poisoning. A few cases have terminated suddenly from embolism or syncope. The cases that have proved fatal from laryngeal exudation have, many of them, been reported as croup.

In the fall of 1879, just after the fires were started and the doors closed, diphtheria made its appearance among the clerks of a large dry-goods establishment. Within two or three weeks twenty-five or thirty had been attacked by the disease, and four had died. On investigation it was found that the soil pipe leading to the street sewer had parted, and that sewer gas had freely entered the building. The old pipe was at once replaced by a new iron pipe and extended to the top of the building. There were no other cases of diphtheria in that locality.

Per contra, we have the following case: During the summer, a house was built in what is supposed to be the most healthful part of the city. No other house was within half a block of it. The situation and sanitary condition could not be better. Not a case of diphtheria had been heard of in that locality. No member of the family that moved into this new house had seen a case of diphtheria. The house was furnished with entirely new furniture. Two or three weeks after moving in, two of the children were taken with malignant diphtheria.

TOWN OF CORCORAN, 1879.—Epidemic began about the first of June among children who attended a certain school located near a marsh—privies in a bad condition—forty-five cases said to have occurred.

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HOUSTON COUNTY.

Pop. 16,339—*Total deaths in* 1879, 143—*From diphtheria*, 1.

CALEDONIA, 1879.—Mild, sporadic cases of diphtheria have occurred. The surface of the country here is generally high and rolling. Most of the cases, however, were on low ground and among people of filthy habits. Population mostly Scandinavian.

KANDIYOHI COUNTY.

Pop. 10,156—*Total deaths in* 1879, 173—*From diphtheria*, 74.

WILMAR, 1879.—Diphtheria has prevailed sporadically all over this county, and two townships have suffered from epidemic. The families of many of the farmers occupy but one room,—the family, the food, if not always the excreta, certainly the exhalations, all confined in one apartment. A great mortality from diphtheria has at least been co-incident with such a state of affairs. Reporter furnishes the following:

"I visited a family (Norwegian) twenty-two miles north of this place. Two of the children had died of diphtheria the week before. Their bodies had been put in a box in a small woodshed adjoining the house, and were still there; another child died in a few hours after my arrival, and the other two—there were five in all—in a few days. The father had the disease, but recovered. My single visit was the only one made by any physician to the family. These people hardly ever do anything for relief until one or two of the family are dead, and a common practice among them is this: when a patient has been prescribed for by a physician, several families will obtain the prescription or some of the medicine and depend upon it alone.

"I asked these people why they did not bury the bodies of the dead children. They said they would wait and bury them all together when all were dead. There was only one room in the house and no cellar. The family all ate, slept and kept their provisions in this small room. There were no means of ventilation except by opening the door or a window. The atmosphere was so thick that you could cut it with a knife. The children had their clothes on when in bed. The principal food was milk, kept of course in the same room."

ATWATER, 1879.—A serious epidemic began here in the autumn of 1878; disease still prevailing to some extent in December, 1879; population mostly Scandinavians.

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LE SUEUR COUNTY.

Pop. 16,111—*Total deaths in* 1879, 199—*From diphtheria*, 30.

WATERVILLE, 1879.—Sporadic cases have occurred in very bad surroundings.

CLEVELAND.—The disease prevailed in October and November, 1879. Reporter observes: "The disease made its appearance in different parts of the township about seven days from the time the first case resulted fatally. A considerable number of people collected to see the first case, and a public funeral was held, which was largely attended. The majority of cases occurred among children who had not been away from home, but there was intercourse between the families by the adults. Among the people affected by this epidemic, sanitary conditions were bad. If more than one case existed in a family, it was often the case that two or more sick children were kept in the same bed, and a well child was put in bed with a sick one. The disease invariably went through the families which it attacked. Population, American, German and Irish. The water supply was from wells, which, owing to the dry summer and fall, were very low.

CORDOVA, 1880.—The disease prevailed in February and March, mostly in low, moist situations. In about thirty cases one-third proved fatal. Many cases, while seemingly progressing favorably, resulted fatally from the croupous form of the disease suddenly supervening. The water seems to be good here, excepting that it is very hard. In many instances filth could not have been a cause. There are many marshes here in the timber.

MONTGOMERY, 1880.—Diphtheria has prevailed during the past four years in a severe form. Reporter observes: "I have seen many cases in families where extreme neatness prevailed indoors, and the outside surroundings were in the most perfect order. People who live on low marshy ground are as free from the disease as those living on high situations."

LYON COUNTY.

Pop. 6,236—*Total deaths in* 1879, 50—*From diphtheria* 3.

MARSHALL, 1879.—A few sporadic cases in the vicinity. All cases were in American families. A family in which there were five cases and two deaths, lived within fifteen rods of a mill pond. Loads of straw manure had been thrown into the pond above the dam. We have good reason, says reporter, for attributing the cause of disease in this family to this foul pond, the impurities being taken in drinking water as well as in the air.

Four cases of diphtheria occurred in a boarding house for laborers on the railroad. There was a large sink-hole for the reception of slops about ten feet from the door of the house. Typhoid fever has seemed to prevail in regions favora-

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ble to diphtheria. This reporter observes: "I have known diphtheria to be contracted by children visiting houses where the disease had previously existed, one year afterward.

MARSHALL, 1880.—About 40 cases, in the vicinity, with ten per cent. fatality. A lake has been gradually lowering for several years. Last year a portion of it was left with a depth of only a few inches of water. Rapid decomposition of vegetable matter took place, and to the effluvia arising from this lake, reporter attributes the cause of ten cases of diphtheria, with two fatal cases.

Contagion.—A lady and two children, on their way home from Dakota, stopped all night at a house in which there was a case of diphtheria. They left early in the morning. In six days one of the children was taken with the disease, and the other child in two days thereafter. The family, of which they were a part and to which they had come, consisted of the parents and ten children. The parents and one child alone escaped the disease. All the remaining children were attacked within a period of ten days. Two died.

A reporter gives the following: "A girl 15 years old slept in a room where there had been a fatal case of diphtheria six months previously. Eight days after she was attacked with diphtheria. The room had not been disinfected. There had been no diptheria in the neighborhood during the six months.

"Absolute quarantine regulations, cleanliness and disinfectants are the means of prevention."

TRACY, 1880.—About the first of May a Norwegian family removed from the vicinity of Mankato into a house with another family about one and one-half miles from Tracy. Soon after there were seven cases of diphtheria in the house and five deaths. An American family lived one-fourth of a mile distant, and to this family the disease seems to have been communicated by the former—5 cases and 4 deaths. No further spread of the disease from this source.

In an American family two miles from Tracy, with good surroundings and of neat habits, three children out of four had the disease and two died. It seemed more malignant as it continued in the family, the last child being sick only three days after the attack. 22 cases during the year, in a population of 1,000; on 12 square miles, 14 deaths.

McLEOD COUNTY.

Population, 12,199; *Total deaths in* 1879, 119; *from Diphtheria*, 10.

BROWNTON, 1880.—About 60 cases in the three autumn months. Of these 12 had croupous diphtheria, and of the 12, 8 died. The disease was found in small, crowded rooms, and where the surroundings were filthy. Water supply did not seem to have much to do with it.

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MEEKER COUNTY.

Pop. 11,708—*Total deaths in* 1879, 141—*From diphtheria*, 26.

1879.—Diphtheria prevailed in the western third of this county and extended into the eastern part of Kandiyohi county—nationality, Scandinavian. Reporter observes: "I am of the opinion that the water supply must have had something to do with the production of the cases. In this part of the county the water is obtained in the blue clay on which the surface soil is found, and is generally bad, especially in dry seasons."

LITCHFIELD.—Reporter says: "Diphtheria has not prevailed in this place since the settlement of the village. * * * In this immediate vicinity the deep stratum of blue clay is thin, and is perforated at an average depth of about forty feet, at which depth an abundant supply of very pure water is obtained from clean sand and gravel, by means of drive wells.

DASSEL, 1880.—Reporter furnishes the following report: Diphtheria in Dassel, May, 1880; form, malignant; number of cases, 6; deaths, 4; cause and means of propogation, infection imported from Sweden; cases came down in about four days after a box of clothing was opened which had been imported.

MOWER COUNTY.

Pop., 16,805—*Total deaths in* 1875, 182—*From diphtheria*, 31.

AUSTIN, 1879.—Diphtheria began in January, 1879; origin unknown. Of the 48 cases 42 were American and 6 Irish; 34 cases and 13 deaths occurred in the city, in a population of 2,500, and 14 cases and 8 deaths were in the country.

In June, 1877, a woman came from Spring Valley to stop in a family six miles north of Austin. The night before leaving Spring Valley she had nursed two children, both of whom had died of diphtheria during the night. Two days after she came she was taken with sore throat. In about one week her own child and two children in the family to which she had come were taken with diphtheria, and all died in about six days. From this starting point an epidemic traveled principally westward, breaking out in family after family, always when there had been exposure from inter-communication. The disease appeared in all its malignancy, as well when the sanitary surroundings were good as when they were otherwise.

MURRAY COUNTY.

Pop., 3,609—*Total deaths in* 1879, 29—*From diphtheria*, 4.

CURRIE, 1880.—In March four, cases (non-malignant) occurred at one of the hotels in this village. The sanitary surroundings were good. In April and

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May, 30 cases occurred. Eight of them, four of which were malignant and fatal, occurred at another hotel—surroundings bad. Slops from the house had been allowed to run into the well for years. The house is located six or seven rods from the river or pond. The stable stands on the bench between the house and the river. The filth from the stable has been put in the river, and some of the water used in the house was taken from the river previous to the outbreak of disease.

August 1st a case of diphtheritic croup occurred with surroundings as follows: The well was in the barn-yard, with a mixture of manure, mud, and water surrounding it. In the cellar of the house was about a foot of water in which were barrels, boards, etc.

NICOLLET COUNTY.

Pop., 12,351—*Total deaths in* 1879, 188—*From diphtheria*, 21.

COTTONWOOD AND IBERIA, 1879.—In November diphtheria prevailed in a malignant form in the towns along the Little Cottonwood River, and in Butternut Valley in Blue Earth county.

COURTLAND.—Epidemic began in the spring of 1879, the disease having been apparently imported from Mankato, the first cases appearing in a family, some members of which had visited that place when the disease was prevailing there. There were three fatal cases in the first family—sanitary condition bad. The disease then extended over almost the entire township. The people are intelligent Germans, well off and living in good houses. One-half of the township has dry, sandy soil, well drained by the Minnesota River, while the other, or eastern half, is of a rich, black loam, with a clay subsoil, and poorly drained. The disease also prevailed in a Welch settlement on the opposite side of the Minnesota River. In the western part of Courtland, where the drainage was good, the disease was much less fatal than in the eastern part, where there was no drainage.

NOBLES COUNTY.

Pop., 4,430—*Total deaths in* 1879, 35—*From diphtheria*, 1.

WORTHINGTON, 1879.—This section of the State has been comparatively free from diphtheria. In July, 1878, a few decidedly malignant cases appeared in Worthington, in the lower part of the town, along a ditch that drains a slough. Active sanitary measures were employed. The houses were closed and thoroughly disinfected, and lime was spridkled the whole length of the ditch. The use of water obtained from melted ice instead of the surface water was advocated and practiced. The disease spread no farther.

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OLMSTED COUNTY.

Pop., 21,553—*Total deaths in* 1879, 196—*From diphtheria*, 1.

ROCHESTER, 1879.—Only a few sporadic cases in the vicinity during the year. Reporter gives the case of an old man aged 70 years, who moved into a house in which there had been a case of diphtheria six months before. He had lived in the house two months, when, in cleaning out a store room, he removed some old rags to the yard and burned them. He was soon taken with diphtheria.

RAMSEY COUNTY.

Pop. 46,168—*Total deaths in* 1879, 569—*From diphtheria*, 6.

ST. PAUL, 1879.—Diphtheria has not prevailed as an epidemic. Reporter observes: "While there has been, since November 1st, 1879, a good deal of ulcerated sore throat, pharyngitis, tonsilitis and croup, there have been only a few well marked cases of diphtheria.

"The following isolated case attracted much attention, and is given in detail: M. L., aged forty-nine, was a prominent lawyer residing on College Avenue, an elevated position, a fine stone house with good basement and with everything apparently in perfect order. He was a hard-working man, and had always been noted for his robust health. For some weeks preceding this attack, however, he had not been feeling quite as well as usual. On the 4th of April he complained of sore throat and remained at home. The next day he was still sick, but would not go to bed or send for a physician. On the third day he was persuaded to gargle his throat with chlorate of potash, and to have carbolic acid applied with a brush. That night his wife became alarmed and sent for a physician. He found much swelling of the glands on both sides of the throat, great difficulty in swallowing, and an anxious countenance. His skin was cool, almost cold, and his pulse slow and feeble. On both tonsils, the uvula and most of the soft palate, there was the characteristic yellowish-white, slightly raised membrane of diphtheria. The larynx was not at that time involved. The most active supporting treatment had no effect, and he died at the end of six days from the invasion of the disease. Death was apparently caused by the action of blood poison on the great sympathetic nerve; the heart's action suddenly failing.

It could not be determined that Mr. L. had in any way been exposed to the contagion of diphtheria; but he firmly believed that he had contracted the disease while handling some ragged money paid him by Scandinavian farmers from Meeker county, where diphtheria was at the time prevailing. He remembered frequently wetting his thumb with his tongue while counting the money. This was done the week before he was taken sick. The water from a drive well which supplied his house was examined and found to contain a slight excess of chlorine. The rapidity of this case and the delay in recognizing its serious char-

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acter, led to extensive exposure; but in no instance did any person seem to derive any infection from Mr. L.

"Two cases of diphtheria occurred in a girls' boarding-school. The girls are not known to have been exposed to the contagion; but as in a large school new scholars are frequently coming in, it is possible they contracted the disease in this way. The school building is in an excellent condition, the closets and cesspool a long distance from the main building, and the well in a good condition and very deep. These cases were immediately isolated, and directions given that any girls showing symptoms of sore throat should also be put by themselves. Disinfectants were freely used. No other cases occurred."

REDWOOD COUNTY.

Pop. 5,378—*Total deaths in* 1879, 34—*From diphtheria*, 3.

REDWOOD FALLS, 1879.—Epidemic prevailed in this vicinity, mostly in the village, during the year 1878, not confined to any nationality. Reporter says: "The cases in the village were confined almost entirely to the immediate vicinity of four small sloughs, not a family in the vicinity of said sloughs escaping. The cases that occurred in other parts of the town and in the country were mostly due to contagion, or to causes not traceable. All the sloughs had been partially filled with manure, to make foundation for roads. The village council has made an effort to drain the sloughs, and has prevented the depositing of manure in them. Houses here are generally too small to admit of isolation of the sick.

"The only sure way to disinfect a house where malignant diphtheria has been, is to burn it. It is certainly not safe to allow children in such a place for a year."

RENVILLE COUNTY.

Pop. 10,646—*Total deaths in* 1879, 119—*From diphtheria*, 21.

1879.—An epidemic originated in the township of Sacred Heart, beginning in 1878, and extended into the adjoining township of Ericksen — population, Norwegian—about thirty deaths. The majority of deaths occurred in underground houses, such as are common here. The country is an open prairie. No certain knowledge concerning water, except the fact that most of the farmers here are in the habit of digging shallow wells in low places near marshes, to avoid the expense of digging deep wells.

BEAVER FALLS, 1880.—Disease prevailed in November, 1879, and in April, July and August, 1880. Fifteen per cent. fatality. Reporter observes: "In

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most instances I found the wells from which the water was obtained so situated as to receive the drainage from barn-yards and privies. The most malignant cases occurred where surface water, or water from a slough was used. Some cases I thought I could trace to decaying vegetables in the cellar; but I think that fully ninety-five per cent, of all the cases observed were where the water was especially bad, and the sanitary surroundings poor."

RICE COUNTY.

Pop. 22,499—*Total deaths in* 1879, 497—*From diphtheria*, 22.

NORTHFIELD, 1880.—April and May, eighteen deaths in the vicinity. First cases occurred in a family out of the city, on an elevation, with good well, and with all surroundings good. Next, in a family living one half mile from the former. No evidence of intercommunication. Several families in the west part of the city were affected. In these nothing in cellars or about the premises could account for the disease. In several families only one of the children had the disease.

DUNDAS, 1879.—Sporadic cases occurred in the winter of 1879–80. Reporter observes: "Where cases terminated fatally, the residences were on the river side. The rock slopes gradually towards the river. On the level above the bank were certain barns and privies, the soakage from which passed through the crevices of the rock in its way to the river. The village council has taken steps to do away with this evil."

ROCK COUNTY.

Pop. 3,669—*Total deaths in* 1879, 36—*From diphtheria*, 10.

LUVERNE, 1879.—Epidemic began here in November, 1878. First cases were malignant. The well water used in the family in which the first cases occurred was found to contain much organic matter. Contagion evidently aided in the spread of the disease.

SHERBURNE COUNTY.

Pop. 3,860—*Total deaths in* 1879, 42—*From diphtheria*, 6.

ELK RIVER, 1879.—A somewhat severe epidemic of diphtheria visited this place in November, 1879, but by a hearty co-operation of the citizens with the physicians in sanitary work, it was limited; only four or five deaths resulting.

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Reporter gives the following: "In October, 1879, diphtheria appeared in a Norwegian settlement sixteen miles northwest of Elk River. Efforts to secure quarantine were unavailing; public funerals were held against instruction, and the disease spread rapidly. The houses were built of logs hewn square and chinked with moss: the ceilings low and the windows few; the rooms were warm and close, and in winter many persons occupied the same room. The water was found to be bad; the wells were dug at the lowest available point in the vicinity of the houses, frequently at the lower side of the barnyard, and the water was found to be heavily loaded with animal matter.

In the spring the disease disappeaed, but re-appeared with renewed virulence the following autumn (1880). In two weeks there were sixteen deaths in the neighborhood. The county anthorities now took action, obtained the assistance of physicians who made examinations and furnished a set of rules for prevention, disinfection and general hygiene. With these instructions the town board of supervisors took hold of the matter with a will. As the result of this work, the disease entirely disappeared, excepting in one or two families (American), the members of which persisted in having their own way, and regarded the sanitary work as meddlesome interference with what they regarded as their own sacred rights in a free country.

SIBLEY COUNTY.

Pop. 10,731—*Total deaths in* 1879, 108—*From diphtheria*, 3.

HENDERSON, 1880.—In September and October a few cases of diphtheria occurred in Henderson, and in the country outside city limits several families were affected. It is reported that in forty cases the cause could be attributed to infection from a single house. Much time and labor was expended in tracing these cases to the apparent source. The people were of filthy habits and lived in log houses. Diphtheritic ulceration on cutaneous surfaces was observed to be the rule rather than the exception here. Reporter says: "The disease was not very malignant but was always followed by diphtheritic ulcers, sometimes on the neck, but more frequently on the legs and toes. These ulcers had raised edges, were obstinate and painful."

STEARNS COUNTY.

Pop. 22,455—*Total deaths in* 1879, 307—*From diphtheria*, 10.

ST. CLOUD, 1880.—Not many cases of diphtheria in the city of St. Cloud, but general prevalence in the "timber" district at the west. Surface drainage into wells. Reporter observes: "As to its apparent causes, I would call attention to

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its prevalence only in the wet and wooded regions, and in all cases, with unfavorable hygienic surroundings, inferior dwellings, many children in few rooms, no opportunity for isolating the infected, barn-yards filled with manure immediately adjacent to the houses, and with the water supply affected by drainage from the same."

SAUK CENTRE.—No prevalence of the disease in 1880. Four cases occurred directly traceable to contagion received by entertaining at houses persons who were either suffering with, or who had but recently recovered from diphtheria. The soil here is sandy, and the water pure. The disease has never been epidemic in the village. Within ten miles of the village on the clay land it has prevailed in a malignant form. Causes seemed to be want of cleanliness, drainage into source of water supply, large families in small room, contagion.

STEELE COUNTY.

Pop. 12,463—*Total deaths in* 1879, 116—*From diphtheria*, 6.

OWATONNA, 1879.—Diphtheria prevailed as an epidemic from November 1st, 1878, until April, 1879. In the city, in a population of four thousand, the number of deaths was about forty. The nationalities were about as follows: Americans, twenty; Germans, ten; Scandinavians, eight; Irish, five. The sanitary surroundings of cases were, as a rule, poor.

NOTE.—To reconcile the statistics above, as furnished by reporter, with the above from State Commissioner of Statistics report, almost all the deaths in this epidemic must be placed in the first half of the time of the epidemic, or before the end of the year, 1878; as only six deaths from diphtheria are given for the whole county for the year, 1879. It is probable that there is an error in returns to State Commissioner.

ST. LOUIS COUNTY.

Pop. 4,552—*Total deaths in* 1879, 16—*From diphtheria*, 3.

DULUTH.—The city has a population of about three thousand, is situated at the head of Lake Superior, and is mostly built on sloping ground on the shore of the lake and bay. It has the advantage of natural drainage. The water supply is partly from wells and springs, but mostly from the lake. Until February, 1879, it was entirely exempt from diphtheria. Since that time quite a number of cases have occurred. About twenty-five per cent. were fatal. (Here also is evidence that the returns from county to State Commissioner of Statistics were not accurate nor complete for year 1879.)

Reporter observes: "In most of the cases I have observed, the only probable cause seemed to be the use of bad water."

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In this connection we are able to give the following communication, showing the result of water analyses.

LABORATORY OF THE MINNESOTA STATE BOARD OF HEALTH,
RED WING, MINN., AUG. 11, 1879.

DR. V. SMITH—

Dear Sir: The analysis of the samples of water sent by you for examination, gives the following results:

No. 1.—From Lake Superior, July 31, 1879.

Hardness, by the soap test (denoting earthy salts and free carbonic acid)	1.75 grs. per gallon.
Chlorine (denoting common salt)	.1167 grs. per gallon.
Free ammonia (denoting free ammonia and urea)	.008 parts per million.
Albuminoid ammonia (denoting organic matter)	.024 parts per million.

The above is a very poor water.

No. 2.—From public spring, July 30, 1879.

Hardness	9.63 grs per gallon.
Chlorine	1.984 grs. per gallon.
Free ammonia	.186 parts per million
Albuminoid ammonia	.216 parts per million
Nitrates and nitrites	7.2 parts per million.

This water is contaminated probably with animal organic matter. It should not be used.

No. 3.—From private well, July 29, 1879.

(Qualitative analysis.)

Oxidizable matter	Slight,
Ammonia	Marked.
Chlorine	2.51 grs. per gallon.

This water should be suspected. A thorough investigation is advisable. Probably polluted from house slops and privy.

No. 4.—From well on Minnesota Point, July 29, 1879.

(Qualitative analysis.)

Oxidizable matter	Medium.
Ammonia	Marked.
Chlorine	1.75 grs. per gallon.

Rather better than No. 3.

WABASHA COUNTY.

Pop. 18,263—*Total deaths in* 1879, 197—*From diphtheria*, 10.

LAKE CITY, 1879.—Only a few sporadic cases of diphtheria during the year.

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WABASHA gives the same report as Lake City.

MINNEISKA, 1879.—This village and vicinity suffered from a severe epidemic in the year 1878, (see preceding report of this Board). Only a few cases occurred after November 1st of that year. The epidemic referred to began abruptly and ended gradually. Of all the cases only two, these in one family, occurred on the uplands away from the river and the river valleys.

A female, aged 16, employed as a servant in a family living in the village, was attacked with the disease in a mild form. Against the advice of the medical attendant she was removed to the home of her parents four miles away. This was before the membrane had disappeared from her throat. She subsequently recovered. Within three weeks from the time she was taken home all of her sisters, save one, were attacked, and three died. Only one family in the neighborhood had anything to do with these patients, and in this family two cases were developed and one died. These were the first and only cases ever known in that community. It was observed that nurses and attendants were frequently affected with pharyngitis and follicular inflammation of the throat, but in no case was any diphtheritic membrane developed, when the individual was a male above the age of 18 or a female above the age of 21. The large majority of the cases were in girls between the ages of 3 and 18 years.

ELGIN.—A family moved from this place to Chicago in September, all in good health. In October several of the family were taken sick with diphtheria. A boy about ten years old made a partial recovery, had a relapse and died, and the remains were sent to this place for interment. The remains were accompanied by the mother and a little sister four years of age. The coffin was opened and the body exhibited to friends. About four or five days after their arrival the little girl was taken sick and had diphtheria in a mild form. Among the friends a young lady and a little girl contracted the disease, were very sick, but recovered.

WASECA COUNTY.

Pop. 12,485—*Total deaths for* 1879, 124—*From diphtheria*, 6.

WASECA, 1879.—Diphtheria has not prevailed in this vicinity to any extent during the year, 1880. In the county 209 deaths from all causes; 95 from diphtheria; 30 unknown. This shows a very general prevalence of the disease. Reporter says; "Large families of small children in small houses, impure air, unwholesome food and water, and scanty clothing and bedding, make up the necessary conditions for the disease."

ALMA CITY, 1880.—Disease prevalent in malignant form, beginning about the 1st of May and continuing in November.

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WATONWAN COUNTY.

Pop. 5,058—*Total deaths in* 1879, 90—*From diphtheria*, 32.

MADELIA, 1879.—Malignant diphtheria appeared November 26, 1878, in a Norwegian family in Rosendale, ten miles west of Madelia. The family had lived twenty years in a half underground house, with one window, near a creek and slough. No member of the family had been from home for six weeks, and no one had visited them during that time. This was the beginning of an epidemic which spread westward and made great ravages."

1880.—May to October malignant cases occurred; 20 per cent. fatality. Cause attributed to poor drainage in low part of town.

ST. JAMES, 1879.—Concerning the prevalence of diphtheria in 1879, reporter writes, December 13: "Since January 1, 1879, I have observed 131 cases, about one-third of which were in the village, the remainder being scattered here and there over the western portion of this county and the eastern part of Cottonwood county. Rate of mortality about 20 per cent.; longest duration of the disease in fatal cases, 16 days; shortest, 3 days. In the former, death was from anœmia and paralysis; in the latter, from asphyxia. Nationality has had no appparent influence. The whole country is quite flat, and at certain times in the year the wells are full of surface water, besides; in the village, residence lots 50 by 150 feet make it almost necessary that the wells should be in close proximity to sources of pollution."

WINONA COUNTY.

Pop. 27,227—*Total deaths in* 1879, 295—*From diphtheria*, 2.

WINONA, 1879.—Only two deaths were reported from diphtheria during the year. The city has never suffered from any prevalence of the disease. Winona stands on a pervious gravel bed, with no underlying strata of clay or rock. Pure water is obtained from drive wells and from the city water works. The bluffs of the Mississippi in the vicinity of Winona, surrounding the city in the distance, are over 400 feet high. They are of limestone formation, and are irregularly cut down here and there by deep ravines running out to the lowlands of the river.

The few sporadic cases of diphtheria that have occurred in this county, have been on the rolling prairie back of the bluffs. The soil is good here, and there is an underlying strata of limestone. Much cistern water is used.

1880.—A few cases were reported, and a mortality of about 10 per cent.

An American family of ten persons, the parents and eight boys, with ages from two to twenty years, were living on the highest point of a bluff directly back of Winona. There was no lack of good drainage here. A stone allowed to roll in almost any direction from the house would go hundreds of feet either down the bluff in front, or into the ravine behind. The little frame house seen in the distance appears to be a small shanty on the top of the mountain. In

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February, 1881, this family was attacked with malignant diphtheria, without exposure to contagion. All, except the parents, had the disease, the oldest three and the youngest very lightly, the other four dying within a week from the time of attack. Two of the four died of croupous diphtheria, accompanied with much septicæmia, while the other two had no laryngeal exudation. In these, in the latter stage the swelling of the cervical glands was enormous, with much infiltration into the surrounding tissues. There were ecchymoses on various parts of the body, and a complete discoloration of the skin of the neck and upper part of the chest. The mouth could not be closed, and the black, swollen tongue protruded between the teeth. There was a constant flow of dark thin blood from the mouth and nose, the odor was sickening and the sight horrible.

While here there could be no want of good air outside, and no dampness under the dwelling from want of drainage, nevertheless the following conditions were present: A small house, banked high around the walls with straw and manure, a large family confined almost wholly to one small room, with rather scanty bedding and clothing, trying to make themselves comfortable during a long and very severe winter, by excluding the cold air from the close living and sleeping room. The water was obtained by melting snow, or was drawn from the lake at the foot of the ravine, and kept in a barrel in the corner of the room. In the sickness of this family, before any sanitary work was done or curative measures adopted, one had died and two others were in the hopeless condition above described, and one died of croupous diphtheria more than a week after the best sanitary measures possible, under the circumstances, had been adopted.

A case of malignant diphtheria is like a house on fire; the destroying flame must be extinguished early if at all.

Another fact concerning the disease in this family is, that some of the children at least, probably all of them, were not in sound health. Two or three of them suffered most of the preceding winter from influenza, from the effects of which they had never fully recovered. Constitutional conditions and tendencies must always be taken into account in studying the causes of disease. We commit a serious error when we continually look for a single, specific, and wholly external cause for diphtheria.

ST. CHARLES, 1880.—Several cases of diphtheria in St. Charles and vicinity in July and August. The worst cases occurred in the very hot weather, when south and southeast winds prevailed. Of the actual cases about sixteen per cent. were fatal. Of eleven fatal cases two died of diphtheritic paralysis, one from diphtheritic croup, and the remainder from septicæmia.

WRIGHT COUNTY.

Pop. 18,124—*Total deaths in* 1879, 236—*From diphtheria*, 20.

STOCKHOLM TOWNSHIP, 1879.—Epidemic began in the eastern part of Stockholm in the fall of 1878, and continued until the following spring. Population, Swedes; log houses without ventilation, or frame houses with two rooms; vegetable cellar under loosely laid floor; the ground mostly low and damp; water

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supply from shallow wells (surface water); no springs in the town; no means of prevention employed. The board of health consisted of town officers who had no knowledge of sanitary measures nor of the disease. No case was isolated from the rest of the family, and, as a rule, when introduced into a family, the disease affected the entire number. But little medical aid was employed, and no exact statistics were obtainable. The number of deaths was estimated at sixty in the town of Stockholm, and at twenty in the southeast corner of Collingwood.

DELANO, 1880.—The following history of the disease in a family is given: December 16, one child, a girl 12 years old, was taken sick; was seen by physician thirty-six hours later; pulse, 120; temperature, 104; membrane on posterior wall of pharynx with patches on uvula and soft palate. In twelve hours membrane covered the entire pharynx, uvula and soft palate; pulse more rapid and temperature higher; nasal passages now involved; died on morning of December 21. Treatment was active, stimulating, antiseptic. There were three other children in the family; these were kept excluded from the patient; all cloths used by the patient were burned; the rooms were disinfected by burning a little sulphur frequently; after the funeral the whole house was disinfected. A few days after the death of the first, the youngest child was taken sick and died and the oldest son was taken and recovered. The same sanitary measures were carried out as in the first case. The mother had a slight attack during the sickness of the son. There was no spread of the disease from this family. All persons were kept away from the house, no one entering the house at the time of the funerals. The weather was very cold at the time. The cause of the first case, reporter thinks, was clearly traceable to a young lady who had just recovered from the disease in Minneapolis, and who had come to visit this family. She slept with the child first taken; her throat was still inflamed when reporter saw her at time of this child's sickness.

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*TABLE—Showing Total Deaths from Diphtheria, 1879, by Counties—Months and Birthplace.**

COUNTIES.	Population, 1880.	TOTAL DEATHS.		MONTHS.												BIRTHPLACE.						
		In the County.	From diphtheria	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Unknown.	United States.	Germany.	Norway.	Sweden.	Ireland.	Canada.	Other Countries.
Anoka	6,979	65	2	..	..	..	1	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	..
Becker	4,159	46	3	..	..	..	..	..	1	2	..	..	..	..	..	..	3	..	..	..	..	..	..
Benton	3,019	30	3	16	..	..	..	..	..	..	..	..	..	..	3	..	3	..	..	..	..	..	..
Blue Earth	22,885	426	184	1	11	18	14	4	8	11	7	6	20	34	35	..	177	7	..	..	..	..	..
Brown	11,853	191	32	..	2	1	2	..	1	1	1	4	5	6	9	..	30	..	1	..	..	..	1
Carlton	1,234	5	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Carver	14,193	175	21	..	1	3	4	2	2	1	..	1	..	3	1	..	21	..	..	..	..	..	..
Chippewa	5,362	84	12	..	..	1	2	..	..	..	1	2	1	2	3	..	12	..	..	..	..	..	..
Chisago	7,997	52	1	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Clay	5,900	49	2	1	..	..	..	..	1	..	..	1	..	..	..	..	2	..	..	..	..	..	..
Cottonwood	5,554	56	5	..	..	..	..	..	2	..	..	..	..	2	..	..	5	..	..	..	..	..	..
Crow Wing	2,307	15	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dakota	17,414	156	18	1	2	1	1	2	2	2	2	..	1	1	..	..	16	..	2	..	..	..	..
Dodge	11,412	118	6	2	..	1	1	..	..	1	1	..	1	..	..	..	3	..	2	..	..	..	1
Douglas	9,159	81	10	..	1	..	..	5	..	1	1	..	..	..	..	..	10	..	..	..	..	..	..
Faribault	12,990	187	69	1	..	1	..	1	10	8	8	6	6	15	14	..	68	..	1	..	..	..	..
Fillmore	27,125	302	20	1	1	2	4	1	..	2	3	1	1	3	1	..	20	..	..	..	..	..	..
Freeborn	16,074	205	30	1	1	7	3	..	3	..	3	3	1	4	4	..	27	..	3	..	..	..	..
Goodhue	28,505	414	42	6	5	1	2	1	1	1	5	5	9	1	5	..	33	..	4	1	..	..	4
Grant	3,004	41	3	1	..	..	1	..	..	1	..	..	..	..	..	..	3	..	..	..	..	..	..
Hennepin	66,590	933	54	6	6	2	8	10	6	3	1	2	..	3	7	..	52	1	..	1	..	..	..
Houston	16,339	143	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Isanti	5,070	51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Jackson	4,975	60	2	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	1	..	..	..	1
Kandiyohi	10,156	173	74	..	..	1	2	2	1	7	11	8	8	17	17	..	72	..	1	1	..	..	..
Lac qui Parl	4,905	57	3	..	..	2	..	..	..	..	..	..	..	..	1	..	3	..	..	..	..	..	..
Le Sueur	16,111	199	30	..	..	..	..	2	..	2	4	3	9	10	..	..	21	7	..	..	1	..	1
Lincoln	2,946	17	3	..	..	..	..	..	..	..	1	..	..	..	2	..	3	..	..	..	..	..	..
Lyon	6,236	50	3	..	..	..	1	..	2	..	..	..	..	..	..	..	3	..	..	..	..	..	..
McLeod	12,195	119	10	..	..	1	1	..	..	1	1	2	1	..	3	..	9	1	..	..	..	..	..
Martin	5,250	51	3	..	..	..	..	..	2	..	1	..	..	..	..	..	3	..	..	..	..	..	..
Meeker	11,708	141	26	..	7	2	..	5	2	..	2	..	4	3	1	..	23	..	1	..	2	..	..
Morrison	5,877	62	9	1	..	..	..	1	..	1	1	1	2	..	2	..	8	..	1	..	..	..	..
Mower	16,805	182	31	6	6	5	5	4	..	..	4	1	..	..	..	..	31	..	..	..	..	..	..
Murray	3,609	29	4	..	..	..	..	..	..	..	..	2	2	..	..	..	3	..	..	..	..	..	..
Nicollet	12,351	188	21	1	..	..	1	..	..	5	4	2	4	1	3	..	21	..	..	..	..	..	..
Nobles	4,430	35	1	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..
Olmsted	21,553	196	1	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..
Otter Tail	18,741	139	4	..	..	..	2	2	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..
Pine	1,365	17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pipe Stone	2,093	10	2	..	..	..	..	..	..	..	2	..	..	..	..	..	2	..	..	..	..	..	..
Polk	11,450	64	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pope	5,876	77	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ramsey	46,168	569	6	1	..	..	1	..	..	..	..	..	1	3	..	..	1	..	..	..	..	..	..
Redwood	5,378	34	3	..	..	1	..	..	2	..	..	..	..	..	..	..	6	..	..	..	..	..	..
Renville	10,646	119	21	5	1	1	..	1	4	..	2	..	3	4	..	..	3	..	..	..	..	..	..
Rice	22,499	247	22	2	2	1	..	1	1	1	1	2	..	1	10	..	21	..	..	..	..	..	..
Rock	3,669	36	10	..	..	2	4	3	..	..	1	..	..	..	..	..	20	1	..	..	..	1	..
Scott	13,678	180	20	2	3	1	2	1	1	3	..	5	1	..	1	..	10	..	..	..	..	..	..
Sherburne	3,860	42	6	..	..	..	..	..	..	..	..	..	1	3	2	..	14	1	5	..	..	..	..
Sibley	10,731	108	3	1	2	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..
Stearns	22,455	207	10	1	1	1	..	1	1	..	2	1	1	..	1	..	3	..	..	..	..	..	..
Steele	12,463	116	6	2	1	..	1	1	..	1	..	..	..	..	..	..	8	..	..	..	..	..	..
Stevens	3,861	21	1	..	..	..	1	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..
Saint Louis	4,552	16	3	..	..	..	..	..	3	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Swift	7,467	105	3	..	..	..	1	..	..	1	..	..	..	..	1	..	3	..	..	..	..	..	..
Todd	6,128	64	2	..	..	1	..	..	..	..	..	1	..	..	..	..	2	..	..	..	..	..	..
Wabasha	18,263	197	10	1	1	2	..	..	..	..	2	..	2	..	2	..	10	..	..	..	..	..	..
Wadena	2,086	21	10	3	2	2	2	..	1	..	..	..	..	..	..	..	10	..	..	..	..	..	..
Waseca	12,486	124	6	..	..	..	..	..	..	..	..	..	..	2	4	..	6	..	..	..	..	..	..
Washington	19,553	215	5	..	..	..	..	1	..	1	..	1	1	1	..	..	5	..	..	..	..	..	..
Watonwan	5,058	90	32	5	5	5	1	1	5	1	..	1	2	5	1	..	27	..	1	2	..	..	2
Winona	27,227	295	2	1	..	..	1	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..
Wright	18,124	236	20	2	6	..	2	2	..	1	1	..	2	3	..	1	20	..	..	..	..	..	..
Yellow Medicine	5,890	46	4	1	..	..	..	1	..	1	..	1	..	..	..	..	4	..	..	..	..	..	..
Totals		8,777	951	76	67	66	71	56	60	63	74	62	88	127	139	1	887	20	24	5	3	1	11

*Report of Commissioner of Statistics for 1880.

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TABLE—Showing the number of Deaths from each specified Death Cause in the year ending December 31, 1879, with Age and Sex of the persons deceased.

ZYMOTIC DISEASES.	PARENT NATIVITY.					NATIVITY.				AGE.										
						U. States.		Foreign.												
	Both American.	Both Foreign.	American father, Foreign mother.	Foreign father, American mother.	Not reported.	Male.	Female.	Male.	Female.	2 and under 2.	2 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80 and over.	Not reported.
Miasmatic—Order 1.																				
Measles	16	36	....	2	3	25	30	1	1	31	17	7	1	....	....	....	1	....	....	....	....
Scarlatina	71	127	1	1	25	89	99	17	20	110	60	22	31	1	1	....	....	....	....	....	....
Diphtheria	247	650	12	26	16	436	494	10	11	556	112	173	71	23	8	1	....	1	....	....	6
Quinsy	3	2	....	....	....	2	2	1	....	1	....	....	....	2	....	....	....	....	2	....	....
Croup	83	102	3	7	26	122	93	3	3	132	61	27	1	....	....	....	....	....	....	....	....
Whooping Cough	7	40	2	4	5	23	31	1	3	46	10	2	....	....	....	....	....	....	....	....	....
Typhoid Fever—Enteric	88	194	2	4	9	118	121	43	15	14	10	27	38	29	64	81	6	13	8	1	6
Erysipelas	11	14	1	2	3	10	9	8	4	6	....	....	5	2	4	9	1	2	1	1	....
Puerperal Fever	5	23	....	....	2	....	20	....	10	....	....	....	....	....	11	17	2	....	....	....	....
Influenza	3	6	....	....	....	6	1	2	....	6	....	1	....	....	2	....	....	....	....	....	....
Dysentery	16	45	4	8	3	32	22	12	10	38	26	3	3	6	....	....	....	....	....	....	....
Diarrhœa	14	40	5	2	14	31	30	9	5	49	6	1	....	10	2	1	2	3	....	1	....
Cholera Infantum	99	231	13	50	16	232	176	....	1	390	19	....	....	....	....	....	....	....	....	....	....
Cholera Morbus	12	23	....	....	8	22	10	6	5	4	4	3	3	6	12	2	4	2	3	....	....
Remittent Fever	1	2	....	....	....	....	....	2	1	....	....	....	2	1	....	....	....	....	....	....	....
Spotted Fever—Cerebro-Spinal Meningitis	16	25	2	4	6	30	16	2	5	18	3	5	6	9	2	5	2	....	....	....	3
Rheumatism	21	21	....	....	1	12	9	11	11	....	....	....	2	2	4	9	11	2	6	3	4
Fever	24	41	1	2	11	19	25	23	12	22	5	11	7	4	6	3	....	6	1	9	5
Total	737	1622	46	112	148	1209	1188	151	117	1423	333	282	170	95	116	128	29	29	21	15	24

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TABLE—Showing Deaths from Zymotic Diseases for seven years.

DISEASES.	1872.	1873.	1875.	1876.	1877.	1878.	1879.
Order 1—Miasmatic.							
Small Pox	207	8	.....	.....	2	7	.....
Measles	38	38	86	71	20	7	57
Scarlatina	261	233	265	362	217	199	225
Diphtheria	41	236	226	379	370	658	951
Quinsy	.....	.....	.....	20	2	38	5
Croup	60	87	125	134	133	117	221
Whooping Cough	102	157	54	105	130	98	58
Typhoid Fever	315	326	216	250	255	169	297
Erysipelas	23	31	33	33	30	17	31
Puerperal Fever	28	16	20	18	10	22	30
Influenza	.....	8	2	26	1	3	9
Dysentary	241	136	72	149	40	46	76
Diarrhœa	117	218	33	100	45	58	75
Cholera Infantum	269	408	283	351	279	204	409
Cholera Morbus	.....	.....	.....	31	27	43	43
Remittent Fever	15	7	6	2	4	5	3
Spotted Fever	76	59	45	69	44	42	53
Rheumatism	20	26	39	33	32	35	43
Fever	.....	.....	.....	93	80	106	79
Mumps	.....	.....	.....	.....	1	5	.....
Other Miasmatic Diseases	149	179	1	4	29	.....	.....
Total	1878	2184	1627	2236	1751	1972	2665

OBSERVATIONS.

The following conclusions may now be regarded as established facts:

I. Diphtheria is increasing in all the northern States of our country; if not in the severity of individual cases and particular epidemics, certainly in general prevalence. The largest number of deaths from any one cause in the State of Minnesota, during the year 1879, was from diphtheria; being upwards of 13 per cent. of the whole number of deaths from all causes. In 1880 the rate was probably greater.

II. The disease is, to a great extent at least, preventable by sanitary means.

At the late meeting of the American Public Health Association, in New Orleans, the following resolutions were offered by Dr. D. W. Hand, of St. Paul, and were passed without opposition:

Resolved, That the contagiousness of diphtheria is now well established, and that the disease should in all cases be treated with the same isolation and quarantine that is everywhere enforced against small pox.

Resolved, That, as we know little or nothing of the origin of diphtheria, we will request the National Board of Health to continue their investigation as to the causes of this disease.

At the same meeting, Dr. Elisha Harris, of New York, read a paper entitled "A medical view of the domestic pestilences," etc., in which he enumerates "certain personal and social conditions and causes which facilitate the propogation and fatal operation of diphtheria," as follows:

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First—Failure of family physicians, nurses, and the community to regard and treat the presence of diphtheria, as a self-propagating malady, and especially to regard and sanitarily treat all out-flowings and excreta from the patients as contagious and requiring immediate and effectual disinfection.

Second—The failure to organize all nursing and personal attendance of the sick, so as to exclude all who are not employed under medical supervisions, for the care of the patients and all that pertains to them. In other words, the want of central and effectual sanitary advice concerning the sanitary care of the sick.

Third—Failure to effectually disinfect the entire premises and all material of the domicile where there has been diphtheria.

Fourth—Failure to recognize and act upon the medical fact, that persons convalescent from diphtheria may convey infection of the malady several weeks after recovering from the sick bed.

An important error has existed, not less, perhaps, in the popular notion than in professional opinion, which has perplexed and in a manner hindered sanitary work for the prevention of diphtheria. I allude to the general impression or ill-defined opinion that there exists, if only it could be found, a universal and specific cause of diphtheria. We know that diphtheria, like all other zymotic diseases, whether existing in the form of a malignant epidemic or as a sporadic disease, may be due to a variety of causes. This we have learned by observation rather than by speculation. Favoring conditions, single or united, may become active causes.

I. Diphtheria is a contagious and infectious disease. A child comes home from school with a sore throat; the next day it is found to be sick with diphtheria, and in a few days the whole family of children come down, one after the other, with the disease. A direct contagion was received by the child at school, and from this one by the other children at home. Again, the mother of a family nurses sick children in a neighboring family, or attends a funeral of a child dead from diphtheria. She may not have the disease herself, but in three or four days her children are sick with diphtheria. They have contracted the disease from an infection brought to them from the home of sickness or of death in the clothing or about the person of the mother. In both of these instances something more was required for the extension of the disease, than the existence of the contagious principle in the breath of the child, in one case, or the clothing of the mother, in the other, viz: a susceptibility to the influence of the contagion on the part of those to whom the disease was communicated. The seed of contagion had to find its favoring soil in the bodies of those who thus developed the disease. These families lived in good circumstances, and with good sanitary surroundings, yet the members became victims of the disease thus introduced, and some of them died. There was in them a physiological teadency to receive and appropriate the infection. In other families that tendency might not exist in sufficient degree to allow the development of the disease.

Now, as the result of observation, we know that if these families, with the contagion of diphtheria thus brought to them, and having in themselves a susceptibility to the disease, instead of living in the observance of hygenic laws, and in the midst of good sanitary surroundings, had at the same time been subjected to the evil influence of bad air, impure water, and unwholesome food, t is e asy to believe that the destructive power of the disease would have been greatly increased.

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The practical question now is, to what extent are the causes of disease in cases like these preventable?

First—Good regulations, rigidly enforced, would render the chances for children to contract diphtheria far less than is the case at the present time.

Second—Every intelligent person in the State should be so instructed and impressed, that no one should be allowed to nurse cases of diphtheria and go directly from the infected house into the presence of a family of children. There should be no public funeral in case of death from diphtheria.

Third—The unsanitary conditions of air, water, and food, which not only intensify zymotic disease, but are often the especial causes of the same, are in a great measure remedial.

Fourth—If good sanitary regulations were rigidly and generally enforced, and hygenic laws observed, may we not suppose that individual susceptibility to disease, especially of the zymotic classes, would be greatly lessened among all classes?

II. Diphtheria often originates sporadically from the operation of various external causes. These are of greater variety than, and not limited to, what are usually denominated filth causes. It is a disease principally of the north temperate zone. Its history in ancient and modern times and in different countries, shows that there have been far-reaching and long continued epidemic influences which have been independent of local causes. This is evident from the fact that diphtheria has at different periods invaded whole countries, in different parts of which it has existed with various degrees of malignity for many years, then to disappear, leaving these countries entirely exempt from the disease for long periods.

There are, however, many tangible and accessible causes of the disease, and it is these with which, as sanitarians, we have to do.

Cold and damp air in and around dwellings; decaying floors, sills, and foundations of houses; decaying vegetable matters in cellars under living rooms, are among the most common of the apparent causes of diphtheria.

It has been found that the hillside in valleys, about where the springs of water flow out from the strata of clay or rock, is unfavorable for the location of residences. This is true of any place where there is a liability to soil saturation on account of an underlying strata of clay or rock.

IMPURE WATER.

While typhoid fever is known to result from water impurities of animal origin, such as are found, for instance, in wells which receive the leachings from defective sewers and privies, diphtheria is often caused by water rendered impure by decomposed vegetable matter. Surface wells, whose water holds the immediate leachings of the soil, and wells with old, decaying, wooden curbing, are the most objectionable. The water of a well that has held the body of a dead cat for weeks may make one sick, especially after the fact comes to be known; but it is not so likely to cause diphtheria as that from another well, whose water may seem to be quite pure, although containing the products of vegetable decomposition in abundance.

In reviewing this study of a single prevailing disease in our State, we are unavoidably impressed with the importance of some more complete system of sanitary work which shall be supported by law and made effective throughout the whole extent of our commonwealth.

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APPENDIX A.

LETTER FROM C. N. HEWITT, M. D.,
Secretary of the State Board of Health of Minnesota.

RED WING, Dec. 3, 1880.

Dr. Franklin Staples, Chairman Committee on Diphtheria:

DOCTOR:—As requested, I contribute a paper to your work as a summary of the practical conclusions to which the work of my office for the past two years has led me.

While I am glad to be able to report an increasing disposition on the part of parents and local authorities to study and use means of prevention in dealing with diphtheria, I am compelled to state that such efforts are still the exception, not the rule. They have been made in country townships and villages, but not at all in the larger towns and villages. Your own researches have demonstrated that the disease is as yet not on the decline, but rather shows a disposition to become endemic. There is, therefore, all the more reason to persevere in our efforts to increase popular knowledge and to awaken the sense of responsibility on the part of parents and communities as respects this and similar insidious and fatal diseases. To this end the first step is to continue to "pile up" the evidences of the *contagious character* of diphtheria. Enough evidence to satisfy the educated physician is rarely enough to satisfy an average parent or local authority. It must be presented, too, in a different way, in every way, in fact, which can attract attention and secure belief. It must be demonstrated, further, that the peculiar poison of the disease remains, and possibly grows, in the material of clothing and bedding, and in the floors, walls and furniture of dwellings; and in such form as easily to infect susceptible persons brought in contact with such material. You already have abundance of such evidence and my correspndence affords still more. We are able to show, that in clothing it has been conveyed long distances in the coldest weather.

If we can succeed in impressing these truths upon the popular mind, the practice of *prevention* in dealing with diphtheria, follows as a matter of course.

PRACTICAL MEASURES OF PREVENTION.

First—The immediate and absolute quarantine of all existing and suspected cases of the disease. This is really the *sine qua non*, but the most difficult to

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secure at present, and chiefly because it is or should be a matter of domestic sanitation by parents, for their own and their children's benefit. When possible, this is the best and truest quarantine, *in the family for the family.*

I know, from personal experience in my own family, that an absolute seclusion and quarantine of the sick, is not only easy in any average house, but that it contributes greatly both to the recovery and comfort of the sufferer. Beside this, the first thought in sickness, it affords the surest guarantee of safety to the rest of the family. These measures adopted in the family of victims of diphtheria, it is evident that the very same measures constitute the warrant of greatest safety for the community in which the sick one lives.

If we can, therefore, persuade parents of these things, the functions of local authorities and health boards in the same direction, will be materially lightened and facilitated. Popular sentiment will come behind them, in case of wilful parental neglect, or in cases where, from poverty, parents are unable to do as they ought. The public purse will be opened and public sympathy awakened, so that for such sufferers, all that can be done will be done, while at the same time public safety is in the best way secured.

We must call on our professional brethren to help with tongue and pen, and, above all, by example. Ministers of the gospel are bounden by their very profession to come to our aid, and the public press stands ready to print every truth bearing on the subject.

While I believe heartily, that we should rely on education and every art of persuasion, I would not forget that the people themselves, through the legislature, have ordained laws and constituted boards of health for their enforcement. Such boards have their duty plainly laid out for them and must be awakened to their performance. But even for them tact and judgment will go far to prevent resort to legal measures, if they will but use the same knowledge of men which aids their members in their individual affairs.

I do not know that I can add to what I have written.

Yours truly,

CHARLES N. HEWITT.

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APPENDIX B.

Circular No. 1, 1880.

SUGGESTIONS CONCERNING RESTRICTION AND PREVENTION OF DIPHTHERIA.

CONCERNING CAUSES.

FILTH.

Diphtheria is a contagious and infectious disease. Whatever causes may conspire to develop the first cases in a community, the disease is found to occur most frequently and to be most fatal in filthy localities.

The common and visible forms of filth are seen in the untidiness of living and sleeping rooms, in the filthy condition of clothing and persons, in decaying garbage in cellars, in the faulty condition of cess-pools and privy vaults, etc. There are many other and probably more dangerous forms of pollution in the invisible and often inodorous gases from illy constructed drains and sewers, in the air over the soil of back-yards which has been saturated with filthy slops, in poisonous exhalations from the human breath and body, and in unventilated rooms. Danger lurks not unfrequently in drinking water, which, having the appearance and taste of pure water, has been made impure and poisonous by earth leachings. The poisons of disease may reach the body in milk and food. These are some of the conditions favorable to the development of contagious and infectious diseases, such as diphtheria, scarlatina, typhoid fever, etc.

Because of these facts, the careful observance of the following rules will aid in the prevention of diphtheria.

1. Every form of filth in, beneath, or about the dwelling should be removed. If the soil is damp, it should be drained and suitable disinfectants applied where filth has previously existed. The most efficient disinfectants are *sunlight* and *pure air*.

2. But, because this disease is beyond individual control, every city and town should have efficient regulations and suitable provisions for securing a good sanitary condition of its whole territory. This is best done by a local board of health, organized as required by law. Among the duties performed should be:

First—The proper instruction of the people in the observance of sanitary rules.

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Second—The careful inspection of all premises by a competent health officer.

Third—The removal, as far as possible, of all causes of disease, and this by compulsory measures when necessary.

CONTAGION.

The contagion of diphtheria has been found to have a more material character than that of many other contagious diseases. Thus, while it may be transmitted to a certain distance through the air, it is apt to attach itself to clothing, bedding, furniture, etc., to be retained for a long time in the walls of rooms, and to be conveyed by water, milk, and other articles of food. Therefore,

1. Every case of diphtheria should be promptly and effectually isolated from the public, and especially from children and young persons. Nurses in the care of the sick should be restricted in their intercourse with other persons. The sick should be separated as far as possible from well children in the same family. The isolation, however, is too imperfect to be of much value, if parents and friends permit themselves to pass, without change of clothing or other efficient precaution, from the sick to the well children, having the care of both at the same time.

2. The apartment in which a case is to be treated should be previously cleared of all needless clothing, carpets, and other material likely to harbor the infection. The room should be kept dry, and should receive all the sunlight possible and a liberal supply of fresh air, without currents directly upon the patient. If the house has more than one story, an upper room is preferable to one on the lower floor, because of the possibility of more complete isolation there and of better air and light.

3. The discharges from the throat, nose and mouth of the patient should be received on soft pieces of cloth which should be burned.

4. The excrements of the patient should be at once buried, and the vessel receiving the same should be frequently disinfected by sulphate of iron (copperas) in powder or solution, or by some other reliable disinfectant.

5. Soiled bed and body linen should be placed in *boiling* water, or in water containing chlorinated soda, chlorinated lime, or a solution of chloride of zinc, and never be allowed to pass into the general wash.

6. Persons having recovered from diphtheria should not be allowed too soon to associate with other persons, especially children, or to attend school, church, or any public assembly.

NOTE.—It is impossible to give a definite rule as to the time that persons convalescent from diphtheria should be restricted in their intercourse with others; but, however well otherwise a patient may seem to be, if there is any remaining evidence of disease in the throat or unhealthy discharge from the nose, if the body has not been entirely and repeatedly cleansed, and any clothing be worn that was used during the sickness, there is probable danger of contagion.

7. In case of death from diphtheria, the clothing should be burned or placed in boiling water, the body should be placed in a coffin with disinfectants, and the coffin tightly closed. *There should be no public funeral.* It is especially important that children should be excluded from, and that persons having children in their families should avoid entering houses where death has occurred from this disease, or attending the funerals.

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8. The room in which there has been a case of diphtheria should be thoroughly disinfected by exposure, for several hours, to strong fumes of chlorine gas, or of burning sulphur, and then, if possible, it should be exposed to currents of fresh air for several days.

NOTE.—It has been found that the walls of old and decaying buildings which contain a preceptible amount of moisture, especially the walls of old log or timber houses, are peculiarly liable to retain the contagion.

One reason why diphtheria lingers a long while in some towns, where there has been an epidemic of the disease, showing itself now and then in a new outbreak, is that the contagion is allowed to live for many months in a portion of the houses, and is there ready to develop the disease, when a child or other person comes in contact with it who is capable of contracting the disease.

DISINFECTING PREPARATIONS.

HOW TO PREPARE AND USE THEM.

Natural disinfectants.

Sunlight and fresh air.—When it can be used, dry garden mould is a very efficient disinfectant.

Artificial disinfectants.

Chlorinated soda: This is best obtained in the form of Labarraque's Solution, which should be diluted for use with about ten parts of water.

A mixture of four ounces of sulphate of zinc, and two ounces of common salt, to a gallon of water, is easily prepared, and constitutes the chloride of zinc solution recommended by the commission acting under the National Board of Health.

The New York Board of Health recommended the following:—Sulphate of zinc, eight ounces; carbolic acid, one ounce; water, three gallons. This may be freely used in the sick-chamber, and may receive the soiled clothing until it can be further cleansed by boiling.

A solution of sulphate of iron for disinfecting privy vaults, etc., may be made by dissolving two pounds of the sulphate (copperas) in one gallon of hot water. From a pint to a quart of this solution, used twice a day, will suffice to keep down foul odors; a much larger quantity may be needed at first.

To disinfect an ordinary room with chlorine gas:—Having closed all the openings of the room, place in it an open earthen dish containing four ounces of per-

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oxide of manganese. Pour on this one pound of strong muriatic acid, taking care not to breathe the fumes. Leave the room and close the door.

To generate sulphurous acid gas:—Put live coals on the top of ashes in an iron pan, and sprinkle not less than one pound of sulphur on the coals, and use as for chlorine. In both cases the rooms should be thoroughly aired before being entered after the disinfection.

SPECIAL PREVENTIVE MEASURES.

1. Avoid houses where the disease has appeared, until they have been thoroughly disinfected.
2. Secure dryness of the grounds under and around the dwelling by complete drainage, and allow no pollution of the same by any form of filth.
3. Secure dryness and good ventilation of every part of the dwelling.
4. See that no cess-pool remains near the house, and that the privy vault is in a proper condition and supplied with dry earth or disinfectants.
5. Let the sun and air have free access to the house and especially to sleeping rooms.
6. Do not let fair external appearances cover hidden sources of pollution.
7. Secure proper and well-prepared food and comfortable clothing.

N. B.—We apply the term, diphtheria, only to the specific disease, the characteristics of which are now well understood by intelligent physicians and others, and not to the non-specific catarrhal and inflammatory affections of the throat, which the ignorant often miscall diphtheria. In all cases of doubt, the opinion of the family physician should be immediately sought.

The Massachusetts State Board of Health Report for 1878, in a circular letter similar to this, has the following, which we would heartily endorse:

"Although it is not at present possible to remove all sources of epidemic disease, yet the frequent visitation of such disease, and especially its continued prevalence, may be taken as sufficient evidence of insanitary surroundings, and of sources of sickness to a certain extent preventable.

"It should be distinctly understood that no amount of artificial disinfection can ever take the place of pure air, good water and proper drainage, which can not be gained without prompt and efficient removal of all filth, whether from public buildings, crowded tenements or private residences. In the opinion of the Board this is likely to be done properly only through independent local Boards of Health, the appointmant of which in all cases we most respectfully but earnestly urge upon the citizens of the State."

The substance of many of the above practical suggestions has been published in reports and circulars issued by the State Boards of Health of Massachusetts, Michigan, Wisconsin and North Carolina.

NOTE.—Most of the foregoing suggestions are applicable to the prevention and management of other zymotic and contagious diseases.

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CORRESPONDENTS.

The following list comprises the names and addresses of the physicians of the State, who, in answer to the circulars of the committee, have kindly furnished most of the data for this report:

S. B. Sheardown, Stockton; J. W. Andrews, Marshall; S. R. Wakefield, Anoka; C. E. Piersons, Marshall; O. H. McMichael, Vernon Centre; O. W. Gibson, Austin; Geo. D. Swaine, Le Sueur; C. O. Cooley, Madelia; W. M. Evans, Granite Falls; K. Wakefield, Hutchinson; D. W. Hand, St. Paul; S. C. McCormick, Duluth; T. J. Catlin, Delano; V. P. Kennedy, Litchfield; O. S. Lout, Mazeppa; Ira Bishop, Mapleton; H. P. Porter, Claremont; Ira N. Bishop, Howard Lake; C. G. Slagle, Winnebago City; J. W. B. Wellcome, Sleepy Eye; C. Heinsma, Centre City; G. L. Gates, Winona; D. F. Brooks, Minneiska; J. L. Force, Heron Lake; C. S. Dietz, Le Sueur; John N. Pains, Willmar; E. C. Gile, Princeton; R. M. Reynolds, Fergus Falls; J. H. James St. Peter; C. H. Mitchell, Elk River; S. S. Walbank, Duluth; E. A. Tupper, Zumbrota; L. P. Dodge, Farmington; R. L. Moore, Spring Valley; N. K. Whittemore, Elk River; A. Gurnon, Little Falls; J. E. Tibbetts, Cannon Falls; R. S. McMurdy, Minneapolis; W. W. Holden, Hokah; E. P. Case, Waterville; P. H. Millard, Stillwater; A. F. Whitman, Spring Valley; L. W. Munger, Fair Haven; H. S. Hill, Owatonna; R. D. Barber, Worthington; J. W. Dal, Le Sueur; A. P. Rounsevell, Delano; C. Vilas, Lake City; F. W. Cram, Jordan; W. T. Adams, Elgin; C. A. Wheaton, Jr., St. Paul; A. W. Hill, Pleasant Grove; C. M. Ferro, Tracy; L. L. Tidball, Jackson; M. E. Woodling, South Branch; H. E. Grover, Rushford; L. Redman, Preston; H. L. Beebe, St. Cloud; J. C. Fitch, Hastings; J. E. Finch, Hastings; J. H. Orcutt, Byron; T. W. Hammond, Montgomery; F. A. Sanborn, Rochester; J. C. Crary, Lake City; J. Q. A. Vale, Homer; D. E. Cummings, Waseca; S. W. Ranson, Dodge Centre; N. J. Pinault, Osseo; N. P. Shepard, Currie; W. C. Eustis, Farmington; L. F. Hance, Minneapolis; C. McCollum, Dassell; M. H. Shepard, Long Lake; J. P. Cochrane, De Graff; J. G. Bemis, Waterville; J. Craft, Worthington; Otis Ayer, Le Sueur; C. H. Boardman, St. Paul; S. Seeley, Cordova; Daniel Leasure, St. Paul; E. C. Cross, Rochester; M. L. Cutler, Adrian; D. Straw, Wells; A. H. Trow, Chatfield; S. D. Flagg, St. Paul; W. G. Goff, Le Sueur; E. Phillips, Minneapolis; G. R. Patton, Lake City; C. W. Crary, Lake City; W. D. Flinn, Redwood Falls; F. W. Van Dyke, Wabasha; F. McGuire, Blue Earth City; S. Miller, Witoka; H. J. Young, Waseca; Q. A. Low, Wabasha; A. C. Wedge, Albert Lea; A. W. Stinchfield, Eyota; A. Plummer, Hamilton; E. S. Frost, Willmar; H. J. Seignorette, Henderson; Wm. Root, Elysian; Chas. Hill, Pine Island; J. S. Gibson, Atwater; F. A. Dunsmore, Minneapolis; S. Blood, Owatonna; S. B. Humphrey, Cordova; R. O. Crawford, Luverne; A. E. Spaulding, Luverne; H. M. Sargent, Concord; Alfred Muller, New Ulm; H. Wolrath, Minnesota City; J. M. Wheat, Lenora; C. R. Bacon, St. James; S. S. Eaton, Benson; F. E. Bissell, Litchfield; W. W. Sweney, Red Wing, A. J. Murdoch, Taylor's Falls; J. R. D. Cousens, Dundas; R. W. Twitchell, Chatfield; A. W. Giddings, Anoka; G. R. Maloney, Belle Plaine; J. A. Garver, Dodge Centre; Brewer Mattocks, St. Paul; M. Hagan, St. Paul; G. Weston Wood, Faribault; Geo. O. Moore, Worthington; A. H. Steen, Cottage Grove; T. E. Hall, Preston; O. H. Hall, Zumbrota; C. K. Bartlett, St. Peter; A. J. Stone, St. Paul; F. L. Woodward,

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Claremont; C. H. Glidden, Pine Island; R. Parkin, Minnesota Lake; H. P. Johnson, Hancock; Geo. Neulands, St. Cloud; L. S. Crandall, Lamberton; R. Randall, Renville; J. C. Bardwell, Pleasant Grove; Thos. McDavitt, Winona; J. L. McMahon, Madelia; W. F. Holden, Hermann; Chas. E. Smith, St. Paul; L. B. Sperry, Northfield; W. H. Thursmond, Brownton; E. D. Stoddard, High Forest; D. B. Collins, St. Peter; F. L. Puffer, Beaver Falls; H. S. Hersey, Stillwater; W. H. Woods, Montgomery; C. W. Howe, Sleepy Eye; W. H. Robbins, Utica; Jas. Davenport, St. Paul; B. R. Palmer, Sauk Centre; A. M. Rathburn, Osakis; P. E. Jones, Red Wing; A. H. Salisbury, Minneapolis; A. O. Gilman, St. Cloud; C. E. Dampiere, Crookston; Chas. Berry, New Ulm; C. L. Bohannan, Tracy; W. W. Furber, Cottage Grove; Wm. Baldwin, St. Paul; M. Sullivan, Adrian; L. P. Burrington, Alma City; W. W. Truman, Anoka; H. L. Coon, Northfield; G. C. Wellner, Springfield; C. N. Clark, St. Charles. J. P. Davis, Kellogg; H. L. Hubbard, Morris; J. B. Le Blond, Sioux Falls, D. T; E. F. Horst, St. Paul; D. J. Lathrop, Granger; M. A. Trow, Chatfield.

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APPENDIX C.

A special report, made by Chas. Berry, M. D., of New Ulm, and added here by the Secretary of the Board:

NEW ULM, Minn., Nov. 20, 1880.

Dr. Chas. N. Hewitt, Secretary State Board of Health:

DEAR SIR—Yours of yesterday came to hand this morning, and I hasten to reply. I am glad to see you taking so much interest in preventing the spread of diphtheria by the proper use of sanitary measures and the quarentine of patients. As you well say, the proper way to cure the disease "is not to have it at all." Of this fact I am thoroughly convinced, and have positive evidence to substantiate my opinion.

Now for the facts. In the spring of 1879 there were no cases of diphtheria within a radius of twenty miles from New Ulm. In May of that year a young Swede girl came from Northfield (or the immediate vicinity), on a visit to a relative by the name of A. P. Johnson, in the town of Cornish, Sibley county, just over the line from Nicollet county. This girl came directly from a house where there were several cases of severe diphtheria, and some deaths. On the third day after her arrival she was taken sick with some form of throat trouble, from which she died on the fifth day (no physician in attendance). Her room-mate and companion, a young lady of sixteen, was taken with the same trouble and died without medical attendance. A child of eight years was also taken down and an empiric was called who pronounced the case to be "either scarlet fever or measles," and wholly without danger, yet this child died next morning from laryngeal diphtheria. The second day after this I was called to see three more cases in the same family, and they each and every one had a severe form of diphtheria, with enormous glandular swellings. One death.

At this time it was utterly impossible to convince the people of the extreme contagiousness of the disease, and the clergyman in two instances called it a visitation of "God's wrath upon the people" for their many sins; said that it was not contagious, and that it was the imperative duty of all children and adults to visit the sick, and attend the funerals, which were public, the coffins being opened in church, that "all might contemplate the wisdom of their divine Creator." Now what were the results? Just as I predicted. From this one family it spread to the families in the immediate vicinity, and especially to those who attended public funerals, while those people who refused to visit the sick or attend funerals, escaped almost entirely. At the first outbreak, the disease was confined almost exclusively to the Lutheran Swedes. Still, it gradually gained headway and intensity, spreading from Cornish, in Sibley county, where it first

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started, through the towns of Lafayette, Bernadotte and Courtland, in Nicollet county, where we had the same ignorance and prejudice to contend with (only to a greater extent) that we had in Cornish.

The Welsh people of Blue Earth county do their marketing largely at Courtland Station. The result was natural. The disease was carried over the river, and those poor people passed through one of the most malignant epidemics that it was ever my fortune to witness.

The disease still traveled on, passing up through the towns of Linden and Lake Hanska. In one year it had made the entire circuit and completely surrounded New Ulm without entering. By this time Sleepy Eye was infected, and the large numbers of little mounds in the graveyard tell the tale too truly of the malignancy of the disease.

From this point it followed the railroad west, and the towns along the entire line have suffered more or less, some of them quite severely.

A Mr. John Pickle and wife living at Golden Gate, Brown county, were summoned to Lamberton. Their sister's children had contracted the disease. The mother obeyed the call, staying there until she had paid the last sad rites to her two little ones? Returning home, a distance of forty miles or more, by wagon, the weather very cold, what was more natural than for father and mother to fondle their own little ones. But, alas! their kisses were contaminated, were loaded with poison, and two little graves on the hill-side within the next ten days was the result. All three of these children were taken with diphtheria within four days after the arrival of their parents. Up to this time there had not been a solitary case within six miles of this family. There had been no other chance of exposure. The parents were intelligent people and believed in contagion, but thought that so long a drive in a cold day would surely destroy the poison. From this family it spread through other townships. Mr. Nicholas Picker, wife and infant, of New Ulm, attended a wedding in Slaepy Eye, sleeping in the same house and room where three children had died three or four months previously, and nothing had been done to disinfect the house. The fourth day after their visit their little one had well-marked diphtheria, and in three days died.

One year ago, my wife assisted a neighbor lady in the care of a dying infant. Four days later, she had the same disease, and for five days her life was in great danger. My student, Wm. Wakefield, contracted the disease last September, by holding a steam atomizer several hours in front of a little patient of mine, who was dying with laryngeal diphtheria. In October last, I was called to Henry Dunwell's family, in Cornish, Sibley county. There had been no cases of diphtheria in the town for more than a year. I found four children and two hired men all sick with diphtheria of an extremely malignant type; the two hired men and one child dying. I found in the employ of Mr. D., a Swede girl by the name of Katie Bengson. She had been there but a few days when the six were taken down, and upon inquiry I learned that her father had lost three children some two months previously, and nothing had been done at Bengson's to purify or disinfect the house or clothing. The girl evidently carried the poison in her clothing six or seven miles and communicated it to her employer's family.

Last September we had an extensive outbreak in this city, and for a time it seemed beyond control, but by quarantine of patients and other sanitary mean it lasted but a short time, still there were many deaths.

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This epidemic originated in a Russian family, the well children attending school, and the family saying nothing about sickness until there had been two or three deaths. The seat mates of these children and the ones that played with them the most, were the first to have the disease. From these cases it spread rapidly, until at one time there were from sixty to seventy in our city. I visited, in one day, thirty-seven cases.

Again, witness the case of Dr. Merritt, of St. Peter, who was attending some malignant cases of diphtheria eighteen miles away. On his return, he kissed his little girl, taking her in his arms and petting her.

Ask the Doctor to-day what he thinks of the contagiousness of the disease, and he will tell you "that his fondling the little darling cost her her life." These are only a very few of the maay instances I know of, where the disease can be traced directly to contagion. Conclusions:—

In the case of A. P. Johnson, had not the girl come from Northfield, there would have been no diphtheria in the family and consequently no deaths. Again, could the family have been quarantined, no public funerals allowed, there would have been no epidemic; the disease would have been confined to the one family.

Had Mr. John Pickle and lady, of Golden Gate, not gone to Lamberton, their little ones would have undoubtedly escaped, or had they been fully aware of the extreme contagiousness of the disease, and made an entire change of clothing, with thorough ablutions, using carbolized water, they would then probably have escaped.

In the case of N. Picker, of New Ulm, there can be no reasonable doubt that his child contracted the disease in Sleepy Eye, by sleeping in the room where other children had died, no precautions having been taken by the family to disinfect the building; also, had the family remained at home, or had occupied uncontaminated sleeping apartments, their child might have been alive to-day.

The cases of my wife, my student, Wm. Wakefield, Dr. Merritt's child, of St. Peter and Henry Dunwell's family, of Sibley county, are so plain that comment is unnecessary. What is required most, is an education of the people to a thorough understanding of the fact, that diphtheria is fully as contagious as smallpox, and "prevention is worth pounds of cure." I would say further, that in nearly every instance, I have been able to trace the sickness to direct contagion.

Hastily yours,

C. BERRY.

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NOTES

OF

CEREBRO-SPINAL MENINGITIS,

ITS PREVALENCE UP TO THE DATE OF ISSUING THIS REPORT, SEPTEMBER 22, 1881,

BY

D. W. HAND, M. D.,

President of the State Board of Health.

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NOTE.—The following memoranda are published as giving all the data in the possession of the board up to date.

In the absence of any certain knowledge of the essential cause of this fatal disease, the board ask of physicians the careful collection and preservation of all records of cases which may occur in their experience, and that notice of the existenee of the disease be sent to the secretary, at Red Wing. C. N. H.

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CEREBRO SPINAL MENINGITIS.

DOCTOR: On Saturday last Dr. Chas. Lord, of Shakopee, came down to see me and brought with him a portion of the deltoid muscle of a child that had died in Shakopee, with what was supposed to be trichinosis—this child and four others in the same family, having been taken sick in much the same way, after having eaten repeatedly of raw ham. Dr. Boardman and I examined the section of muscle under the microscope, but failed to find any parasites. On Monday I received a telegram from D. L. Horn, Esq., president of the council of Shakopee, saying that two children in other families had died in the same way, and requesting the assistance of the State Board of Health to find out the cause. That evening, accompanied by Dr. Boardman, I went up to Shakopee, and found the citizens greatly excited over the sudden sickness and death of the children mentioned.

The facts are, that P. Riley, a farmer, living in a cleanly house on the open prairie, two miles east of Shakopee, had five children, one boy and four girls, whose ages ran from two to eleven years. On Sunday, February 20, after a hearty dinner, the boy, aged eleven years, was taken with vomiting and had a fever all that evening. Next day, Monday, he seemed better, and the parents desiring to attend a wedding in Carver county, opposite Shakopee, brought all the children into town and left them with his sister, who lived in a comfortable house near the center of the village. The parents then went over to the wedding and remained all night. On returning to Shakopee next day, Tuesday, they found all four of the girls very sick with the same symptoms the boy complained of on Sunday, *i. e.* vomiting from and great soreness over the body.

On Wednesday, one of the girls, aged five years, was taken with convulsions and died at noon.

The girl aged seven years, after a free purgation, seemed relieved and has since continued quite well.

The other two girls, aged four and two years, and the boy who was first taken, were still very ill. They presented much the same symptoms. Puffiness about the eyes, forehead, hands and knee-joints; stiffness of the neck and of the whole spinal column; hyperasthesia of the skin; crying out at the slightest touch; photophobia; coated tongue, appetite fair and bowels nearly natural. No vomiting since the first day or two and no active delirium or apparent headache. The youngest child has the left hand and both knees greatly swelled. The two girls lay in a half stupor most of the time, but crying out frequently with apparent pain. The boy is more quiet, says he has less pain and is undoubtedly approaching convalescence.

The brother-in-law with whom Mr. Riley was staying in Shakopee, Mr. Geiser, having five children of his own, became alarmed on Wednesday and moved his family to another house, several blocks away. On Saturday, about noon, his

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babe, aged two years, was taken with vomiting and remained pale and listless until next day, but without much apparent fever. At 1 P. M. on Sunday it went into a convulsion and died at 6 P. M.

A post mortem examination of this child, made by Drs. Lewis and Entrup, showed considerable congestion of the membranes covering the brain, and strange to say, ten different invaginations of the small intestines. It was thought the last condition was brought about by the convulsive action of the muscular coat of the bowels shortly before death. Mr. Geiser's other children remain well up to this time.

Another relative of the Riley family was at the wedding in Carver county, on Monday, having with her a little girl aged about nine years. This child, out there in the country, was taken sick on Wednesday and died in convulsions on Friday. From all we can learn this case presented about the same symptoms as the others. As Mr. Riley's children had been allowed to eat quite freely of raw ham, and the symptoms appeared so much more referable to the muscles than to the brain, it was believed by the attending physicians that they were sufferings from trichina poisoning. Remembering, however, that no parasite could be found in the portion of muscle removed from the Riley child that died, and after witnessing the autopsy of Mr. Geiser's babe, examining the four remaining children of Mr. Riley, and talking with Drs. Lord, Lewis, Mason and Dunn about the symptoms as they had observed them, Dr. Boardman and I came to the conclusion the disease was cerebro-spinal meningitis. We informed the town authorities of the opinion we had formed, and assured them that while a number more cases would possibly occur, it was not probable there would be any wide spread epidemic. We also advised against closing the schools or doing anything to farther alarm the citizens.

Yours truly

D. W. HAND,

ST. PAUL, March 4, 1881. Mem. S. B. of Health.

DR. C. N. HEWITT,

Sec. State Board of Health, Red Wing, Minn.

ST. PAUL, September 1, 1881.

The epidemic of cerebro-spinal meningetis, which first came under our notice in November last, has since prevailed at numerous points in this State and in northern Wisconsin. For the five or six years preceding we had been singularly free from that disease. It now appeared about the same time at points widely separated, and where there could be no suspicion of contagion. It has been seen as frequently in the country, often in cleanly farm houses, as in the towns. If any parts of the State have particularly suffered it has seemed to be the valleys of the Minnesota, Upper Mississippi and the St. Croix. Not only Shakopee, in the Minnesota valley, but Le Sueur, St. Peter and Mankato reported many cases. Minneapolis and St. Paul have had a large share, while Stillwater and Hudson, on the St. Croix, have reported some of the worst cases known.

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In St. Paul we have had, so far as can be ascertained, about two hundred cases, and between November 1st, 1880, and this date have had forty-six deaths. That is about the usual death rate in this disease. In the reports of past epidemics of cerebro-spinal epidemics, everywhere, the average mortality is shown to have been about twenty-five per cent. of those attacked.

Here the treatment that gave the most comfort to the patient allowed him also the best chance for recovery. It was the steady use of anodynes. Bromide of potassa and morphine gave the best results.

As means of prevention we can recommend only the avoidance of damp, cold rooms, the wearing of flannel underclothing, and the free ventilation of every part of an occupied house. There is no risk from cold, dry air, while danger lurks in closed, damp rooms.

D. W. Hand.

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A STUDY OF THE

VITAL STATISTICS

OF INFANCY, IN MINNESOTA, FOR TEN YEARS, BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

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VITAL STATISTICS.

The following data, collected from the vital statistics of the State and from other memoranda, are submitted for two purposes:

1st. To reiterate in another way the evidence heretofore given in these reports that the mortality and sick-rate of the population of this State are larger than they need be, and that they may be greatly diminished if people can be persuaded to use the necessary measures to that end.

2d. To show, with as much detail as practicable, just what can and ought to be done to further the end in view, *i. e.* to reduce the average of sickness and premature death to the lowest point possible for all classes of the population.

In a great variety of ways the partial success of this effort will be found demonstrated in the papers which make up the volume of which this paper is a part. We are glad to be able to report that the people of Minnesota are awakening to their share of this effort and are more cordially in accord with the work of sanitary reform than ever before. This is the testimony of physicians and of local and State boards of health.

The evidence here presented will help to show how far we are, as yet, from the attainment of all the benefits which obedience to the laws of health will secure for us, and will afford good grounds for more courageous and hearty work in the future.

The statistics here given are based upon a study of the reported causes of more than 60,000 deaths reported in Minnesota during the last ten years.

So far as possible all known errors have been eliminated, but the methods of collecting these data are here, as in other States, so faulty that only general averages for a series of years have been used.

Taken in this way, however, and with such corrections as familiarity with them enables the writer to make, they are of value.

They justify conclusions which, already sustained by medical experience, are clear and unmistakable.

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In the ten years 1870–79 there are reported 60,610 deaths among residents of this State.

The average as respects sex is, males, 55.29 per cent. of all deaths; females, 44.70 per cent. of all deaths.

Of yearly averages the maximum for males was 63 per cent., the minimum 52.63 per cent.; greatest variation, 10.37 per cent. The maximum for females was 44.704 per cent., the minimum 37 per cent.; greatest variation, 7.704 per cent.

For five years (1872–77):

Parent Nativity of the Dead.

	Per cent. to total deaths.
Both parents American	23.98
Both parents foreign	52.00
One parent foreign	3.49
Parentage not reported	20.46

As to the influence of the seasons an average of five years by quarters gives this result:

	Percentage.
During quarter ending March	25.62
During quarter ending June	25.80
During quarter ending September	25.28
During quarter ending December	24.27

The difference is less by an average of years, than by a comparison of quarters for any given year, because in a series of years epidemic or exceptional prevalence of disease is less evident.

Ages of the dead. (Average of 7 years.)

	Per cent. of all deaths.
2 years and under	39.73
2 to 5 years	4.81
5 years and under	44.54
5 to 10 years	4.42
10 to 15 years	3.19
15 to 20 years	3.96
20 to 30 years	7.93
30 to 40 years	6.40
40 to 50 years	5.59
50 to 60 years	5.01
60 to 70 years	4.44
70 years and beyond	5.80

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The above table presents clearly the startling fact that in an average of years, 44.55 per cent. of all who die in our state are children under five years of age. This is not the city death rate, but is the average of seven years for all our population.

The variation in this respect between rural counties and those which contain large towns, is not so great as is generally supposed. In 1872, for example, when the writer collated the statistics—

	Per cent. of all deaths.
Houston county gave	37.2
Fillmore county gave	43.1
Ramsey county (with Saint Paul) gave	52.55
Hennepin county (with Minneapolis) gave	43.94

The plan then proposed, by the writer, to maintain this comparison for a series of years, has not been carried out, and so data are wanting. It may safely be assumed, for our present, purpose that the average mortality under five years of age, in large towns, is forty eight per cent. of all deaths, and in rural districts the same average is forty-two per cent., and this in years when there is no marked epidemic. An epidemic in disease of any kind always tells more upon children, and those, too, of tender age.

The fact of such a large infant mortality compels us to inquire, What are its causes? In 1878 I collated the data bearing on this question for six years; (the complete table will be found on page 296 of the vital statistics of that year), and from it the following facts are taken:

Disease causing greatest mortality among children under five years of age.

	Per cent. of all deaths under five years of age.
Premature birth	12.17
Debility	3.58
Inanition	2.60—18.35
Cholera infantum	9.57
Convulsions	6.14
Pneumonia	4.00
Teething	1.21

These are the leading causes of constant operation. They do not vary greatly year by year, and are in some years compared with contagious diseases in small proportion; but their per cent. is so constant as to make them, in the long run, the leading causes of infant mortality.

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As respects contagious diseases and their relations to each other and to other diseases, the following table shows the fluctuations of per cent. to total deaths of two of the classes for a period of ten years:

	Scarlet Fever.	Diphtheria.
1870	6.75	1.78
1871	7.13	1.12
1872	4.99	0.07
1873	3.62	0.95
1874	3.34	3.41
1875	4.37	3.72
1876	5.65	5.39
1877	3.28	5.60
1878	2.81	9.36
1879	2.56	10.83
Average of ten years	4.45	4.28
Max. averages in any one year	7.13	10.83
Min. average over any one year	2.56	0.7
Greatest difference	4.57	10.13

Compare this with cholera infantum:

Average of seven years	4.24
Max. of average in any one year	5.90
Min. average in any one year	3.06
	2.84

The comparison is instructive. In the series of years here given, the average per cent. of mortality of diphtheria, which last year (1880) killed probably more than twelve per cent. of all who died, is not greater than cholera infantum, which averages, year by year, 4.24 per cent. The average per cent. of deaths under five years of age from developmental diseases and occurring mostly in the first year of life, is 8.68, equal to the average loss at same age by scarlet fever and diphtheria together. The evidence could be increased, but the object sought is already attained, which is to show that our greatest average infant mortality is not from diphtheria, scarlet fever, cerebro-spinal meningitis and the like diseases, whose occasional malignancy and mortality attracts so much attention, but from the ordinary affections of the new born, or very young children, which we seem almost to have forgotten, or to have given over to the class of unavoidable and necessarily fatal diseases.

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But before discussing this question there are a few data respecting diphtheria and scarlet fever, worth note:

Ages of the dead by Diphtheria.

	Two years and under.	Under five years.
Up to 1879	25 per cent.	39 per cent.
1879		70 per cent.

Parent nativity of dead by Diphtheria.

Both parents American	11 per cent.
Both parents foreign	30 per cent.
One parent foreign	5 per cent.

This table is imperfect, because data are lacking.
In 1879, however, the following table is true:

Both parents American	25.00
Both parents foreign	70.00

So that the probable truth is that three out of four of the dead from diphtheria are the children of foreign born parents.

Turning to the death rate of scarlet fever. The mortality under five years of age has been, in ten years, 57.7 per cent. of all, and most of the remainder were under ten years of age.

I can add nothing here to the means of preventing or controlling these diseases, which are fully described in the papers herewith published.

The State Board of Health have for the last five years used every endeavor to convince the medical profession and people of our State that diphtheria was as infectious as small pox in its behavior during the late epidemics. It is only within two years that the State Medical Society or the American Public Health Association have gone on the record in favor of this view. In both societies the resolution was moved by a member of the Minnesota State Board of Health. There is also a change in popular opinion as a result of persistent effort which makes it possible to deal with the outbreak of any epidemic more easily and successfully than ever before.

CHOLERA INFANTUM

Is the most fatal disease of infancy and early childhood during the

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summer months, its average of total deaths for seven years is 4.24 per cent.; average of six years of all deaths under five years of age, 9.57 per cent. Its per cent. fluctuates with the intensity of the summer heat and the insanitary conditions of the homes of its victims. So far as we now know it is not a specific contagious disease, as is Asiatic cholera, for example; but is rather dependent upon general causes of ill-health, foul air or water, improper food or clothing whose operation is aided and increased by a high temperature. For these various reasons it is peculiarly prevalent and fatal in large towns and crowded tenement houses. In dealing with this summer scourge of childhood, we have one preventive and curative measure which is above all others in efficiency—removal to healthy country air, food and residence.

For the well-to-do this is easily done, and is becoming more and more common. For the poor no so beneficent charity offers as the excursions and removals which are now so important a feature of the sanitation of towns. It is of the greatest importance that physicians and clergymen unite in the furthering of such thoroughly practical sanitary work. There are very many of our people of all classes who do not appreciate this matter of safety at its true value. There are the self-supporting laboring class, who, if they understood its importance, could arrange a summer vacation for tired mothers and ailing children into the country, with advantage out of all proportion to the trouble and expense they might occasion. It is to be hoped that our ambition for "summer resorts" will not fail to provide for people of very moderate means and for the poor. A rich return in increased capacity for work awaits those who really need the change, more than those whose ability to pay, makes our present system a financial success for the managers, if not a sanitary help to the visitors.

Let us endeavor to secure to all who need this recreation opportunity to have, at an expense proportioned to their means, the fullest benefits which it can give.

But first and foremost give them to the nursing mothers and ailing children of the day-laborers and the very poor.

There is one point worth constant remembrance by every one—that little children are the most sensitive to the influence of unhealthy surroundings, and that their ailments are often the first clue we have to the presence and character of disease causes lurking around or in the house which is the home. Therefore when they are constantly or frequently sick, the parents' duty is, at once, thoroughly to examine the house and all domestic processes to find the

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one or more which are at fault. He may be sure that a careful and intelligent search will find something largely concerned in causing their ailments or in delaying their recovery.

The causes of infant mortality classed in death returns as "premature birth," debility, "still-born" and "inanition" are very properly classed together, depending as they do upon causes which begin their operation before or soon after birth.

Their importance as death causes will be apparent when it is noted that in an average of six years they have caused 18.35 per cent of deaths under five years of age, and 8.64 per cent. of all deaths; twice as great as the average of scarlet fever or diphtheria. It is impossible to discuss them in this paper as their importance demands. For the causes which underlie the mortality they occasion are also instrumental in the death rate from several diseases of adult life among women.

This much may be stated. They are painful evidence of the lack of proper consideration and care for mothers before, during and after confinement.

It is in the centers of population, the towns and cities, that the causes of death we are discussing, operate most disastrously, but not wholly so, for within a short time the State Board of Health has been called upon to investigate an epidemic of child-bed-fever which had killed nearly every mother and new-born child in the settlement within a short time after her confinement. This is a thinly settled country district, and among a foreign population. An utter ignorance of the infectious character of the disorder, and gross neglect of the simplest sanitary rules were found to be at the bottom of the matter. So far as we know it has not recurred.

Another cause of infant mortality is found in the class called local diseases. Of all dying from disease of the nervous system in 1877, for example, 57.13 per cent. were children under five years of age. The average of three years, (1876–77–79) 52.77 per cent. and in the average of six years, 6.05 per cent. of all deaths of children under five years were of this class. Much the larger number are vaguely classed as convulsions and brain disease. More than 15 per cent. of these are under two years of age, and probably 60 per cent. of these are under one year.

The popular explanation is "teething," which like "worms" is made to account for a really greater amount of sickness and mortality than they can possibly occasion.

Leaving out the proportion (large in towns) of children so feeble at birth as to find in convulsions and other brain diseases, speedy

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death, there remains a balance who live a little longer, only to die after a slender stock of vitality is exhausted.

These cases occur not only in towns, but in country districts where the poverty and hardsips of the parents make living a very difficult matter for any but healthy children. The effect of an inheritance of physical bankruptcy is most sadly apparent in families surrounded by every help which mere wealth can supply, and children the offspring of weak, unhealthy parents die, not so much from disease, as from the lack of the physical ability to live, even under the most favorable circumstances.

We have entered far enough into the study of the causes of infant mortality to see that they may be divided naturally into two great classes.

The first class includes all causes which in any way impair the average health of childhood without inducing specific disease.

They are of two kinds:--

(a) Ante natal: In the ancestral peculiarities as affecting health, and in the condition and surroundings of the mother.

(b) Post natal: In the physical conditions into which the child is born. These are peculiar to the race, the family and the house which is the home.

The second great class includes the causes of special diseases which are peculiar and particular in their operation: small pox, scarlet fever, diphtheria, and the like.

It is evident, too, that the first great class are peculiar in their constant operation and their greater average fatality.

They operate in the family and the home. They are those with which parents should be best acquainted; and of whose operation and control they should endeavor to make themselves masters.

This is not so difficult as many imagine. The thing to do is to know and obey the easily understood general conditions and laws of health. The primary conditions of living, not only for children, but for adults, are pure air and water, abundant sunlight, proper clothing, a healthy home, good food, sufficient sleep, recreation and work.

In proportion as these are secured and steadily maintained will be the average of health, freedom from disease and escape from premature death. Children will derive the greatest benefit when the home is completest in all these respects.

Let no one answer to this simple statement of a great and vital truth that it is commonplace, and a poor reliance in need, for the fact is that, as a people, our homes and our habits, especially as re-

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spects the welfare of children, are not what they might be. We do *not* take the care to secure *all the time* fresh and pure air and water in our homes. We do encourage the entrance of disease and death by neglect of the care and precautions which we preach and profess, but which we neglect to practice. The sooner we can come to believe that it is in these respects that we need reform, and that such reform is not to be attained by resolutions alone but by quiet, steady, every-day doing, in the matter of fact dealing, with things which lie nearest to us in and about our homes, the better we will succeed.

As to the second great class of disease causes—the specific disease poisons, individual or family effort do not afford sufficient security.

In all communities there are people who are ignorant or careless as to the spread of infectious diseases from sufferers in their own families to others outside, and many are careless or indifferent as to such diseases any way. There is a genuine fatalism among such people: "If we are to have it we can't help it, and so it don't pay to bother with means of protection." Others resist quarantine or seclusion as an infringement of their rights; others deliberately look upon such diseases as the direct visitation and chastisement of the Almighty, and so regard sanitary restraints and precautions as a resistance to Divine will.

Hence comes the necessity for the abundant powers which the law has given to local and State boards of health to compel obedience to rules for the safety of a whole population. The plain duty of every parent and householder, is, first, to obey such laws eagerly and honestly, and second, to compel others to do the same. Besides the power to control infectious diseases, boards of health have the power to protect the purity of the common air and water supply in the various ways which a glance at the laws will show. These laws should not be, as now, dead letters in the statute book, but by the force of a popular opinion, which every parent is interested to create, become living and powerful aids in the efforts which we are all anxious to make to secure for our little ones, the right and the power to have every aid in the struggle to become healthy and happy youths, capable and efficient men and women. To know and insist on their public as well as their private rights in this direction, is one of the ways in which we can help to accomplish so desirable a result.

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THE SANITARY

WATER SURVEY OF THE STATE.

CHEMICAL ANALYSES OF WATERS FROM LAKES, RIVERS, SPRINGS, WELLS, CISTERNS, AND FROM MELTED SNOW.

MADE IN THE LABORATORY OF THE STATE BOARD OF HEALTH, BY AND UNDER THE DIRECTION OF THE SECRETARY OF THE BOARD.

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SANITARY WATER SURVEY OF THE STATE.

The analyses of well and spring water herewith submitted are, with few exceptions, of samples examined because of known or suspected impurity. The demand for examinations of this kind has been so great as to interfere with the systematic study of the water supply of districts, which it was intended to make. Some well and spring waters examined have, up to that time been regarded as pure, though found on analysis to be foul. In one, to which particular attention was called as a fine sample, more than ten grains of chlorine to the gallon was found, on examination, to be directly derived from the sewage of the house.

The method of analysis in use in the laboratory of the Board is that of Wanklyn, Chapman & Smith. The "moist combustion process" of Wanklyn, is now in use, but was not applied to any samples here reported. Frankland's method has not been attempted, for regular work.

A full description of the source of supply, and of diseases supposed to have been influenced by it, are always required to be sent with sample.

The following blanks explain themselves:

No.....

DESCRIPTION OF WATER SENT FOR ANALYSIS

By.....of.....Minn.

Date of collection.....Season (wet or dry).....Source.....
Nature of soil and subsoil.....Distance and kind of nearest sources of filth.....Amount and kind of sickness in families using the water .....Reasons for asking the analysis.....

DIRECTIONS FOR COLLECTING WATER.

N. B.—Absolute cleanliness in every particular is essential in collecting water for analysis, that serious error may be avoided.

The bottles used should be thoroughly cleaned. Before filling, rinse them three times with some of the water to be collected.

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In taking water from—

1. A lake. Go to the middle if the lake is small, or at least a mile from shore if the lake is large, and plunge the mouth of the bottle below the surface of the water.

2. A stream. Go to the middle of the stream and plunge the mouth of the bottle below the surface of the water. Avoid the outlets of sewers and feeders.

3. A spring. If the spring is deep, plunge the bottle below the surface. If the spring is shallow, dip up the water in a clean glass tumbler, from which pour into the bottle.

4. A pipe. Let the water run a little before filling the bottle. Take water directly from the main, not from a service pipe.

5. A well. Pump out the water standing in the pipe before filling the bottle.

Stop the bottle as soon as filled. Use new and clean corks, and fix them in securely.

Fill out a label on the bottle and the above blank.

Pack bottles in saw dust and send by express, *charges paid*. Send the filled blank by mail.

C. N. HEWITT,
Secretary State Board of Health, Red Wing, Minn.

LABORATORY OF THE MINNESOTA STATE BOARD OF HEALTH.
Red Wing, Minn.....18

REPORT ON A SAMPLE OF DRINKING WATER.

Source .....
History .....
Collected.....18.... Analyzed.....18.....

Physical Characteristics:

Color.....	Lustre.....
Turbidity.....	Taste.....
Sediment.....	Smell.....
Microscopic character.....	

Chemical Analysis:

Qualitative:

Lime.....	Ammonia.....
Magnesia.....	Nitric acid.....
Chlorine.....	Nitrous acid.....
Sulphuric acid.....	Organic matter.....
Phosphoric acid.....	Iron.....
Lead or copper.....	Zinc.....

Quantitative:

Hardness.

Temporary.....	Degrees of Clerk's scale, or	grains per Am. gal. " " " "
Permanent.....		
Total.....		

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Total solids.....	parts per million, or	"	"	"	"
Volatile matter.....	"	"	"	"	"
Ammonia, free	"	"	"	"	"
Ammonia, albuminoid	"	"	"	"	"
Nitrates and nitrites.....	"	"	"	"	"
Chlorine	"	"	"	"	"
Sulphuric acid.....	"	"	"	"	"
Alkaline carbonates, &c.....	"	"	"	"	"
Silica, Alumina, &c.....	"	"	"	"	"

Conclusions:

All examinations of water for special medicinal properties or for purposes of the arts or manufacture, are declined. The sanitary value of the water for drinking or domestic use, or its relation to a specified disease cause, are the chief ends in view in our analysis.

As will be seen by the form of the report of results, all facts discovered are so arranged as to be of practical value.

Of course, as samples of water examined increase in number and variety, collected at all seasons of the year, in different parts of the State, and under varying meteorological conditions, the records of their analysis and history have a value greatly beyond the immediate end in view. The data so collected already fill a portly manuscript volume. They afford evidence of great interest, and when sufficient to justify use for the discovery of averages, and other relations, they will be carefully collated. Any one at all familiar with this difficult study of the sanitary relations of water supply, knows the constant liability to error if one source of information is given undue weight. Chemical, physical and meterological peculiarities are to be studied in the light of the history of the sample, and of those to whom it may be the bearer of the means of health or causes of disease.

Time, patience, slow and steady collection and classification of facts must precede any trustworthy general deductions. Fortunately, while doing this, each analysis and report enables us to send home to individuals, or communities, sanitary advice in the form of an object lesson of which, only too often, preventable disease or death are the hard but effectual teachers. Such reports are a very efficient means of education of householders, teaching, in an impressive way, the necessity for a rigid oversight of the water and air supply of the household.

It is a common experience that a direct relation can not always be traced between a given sample of bad water and a case or cases of a special disease, and it is as common to find a water chemically very bad, in constant use, even in country hotels, or farm

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houses, and in some cases proven by examination to be in direct communication with a cesspool or privy. In several such instances, no specific disease has occurred, though present in other families of the same neighborhood, having a much better water supply. These are exceptional cases, but they are worthy of note. The writer, a believer in specific disease causes, has no difficulty in explaining them. Others are puzzled and are inclined to question whether disease is likely to be spread by impure water. To such persons the evidence of the constant associations of foul drinking water and bad air, with marked evidence of physical deterioration, of which the reports of this and other boards give abundant proof, should have some weight.

Persons under such conditions are peculiarly liable to contract *any* epidemic disease which comes near them, and have done so over and over again. Perhaps no disease of our population is so directly associated with such conditions as typhoid fever, but the evidence is very strong against others also, notably, some of the outbreaks of diphtheria, for evidence of which see the reports in this volume on that subject. The index gives a variety of references.

The inquiries which come to the laboratory as to the best means of protecting water supply, the best form of filters, etc., shows an increasing popular interest in the subject. The frequent impurity of the town and city wells is creating a growing distrust of all wells and springs, and there is an increasing reliance on cisterns for a supply of drinking water.

The usual filter is a partition of soft brick laid in cement. Such filteration is, of course, mechanical, and does not remove organic matters in solution. That such matter floating in the air of city or country is washed by rain on to roofs and into ci terns is evident.

Cistern No. 2 in the following table was very offensive to smell, but afforded drinking water to a family, every one of whom had diphtheria, the children, very severely—one dying. No neighbor had the disease. The symptoms in every case improved on changing the water supply. It is not at all likely that the specific disease came from the cistern water, but its operation was probably assisted by the bad water, especially with the children.

Cistern water should be filtered through animal charcoal, or a silicated iron filter, if to be used for drinking. Even clean charcoal and sand, (if allowed to dry between uses, and the first water coming through thrown away), are very efficient agents, and such

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a filter can be made by any one with a large sized unglazed flower pot.

It is a very important question whether the mineral ingredients in our pure spring water, including the small amount of iron usually found there, are not of importance as affecting digestion, or assimilation, or as elements of food. Even the free carbonic acid which they contain has its use. It is very difficult to explain in any other way, the invariable presence of such ingredients in all good spring and well waters, and the instinctive preference of men and animals for such waters, as the most grateful and satisfying of drinks.

The samples of river water were selected to aid in the study of such water for domestic supply, as was that of the lakes.

Lake Phalon is the best lake water; the difference in the analyses are caused by melting snow water flowing over the colder spring water from below. The admixture, in the springtime, is sometimes very slowly and irregularly accomplished. The study of Mississippi water will receive special attention hereafter as heretofore, as likely to be the source of several town supplies, in the near future.

Duluth	4	Stillwater	7
Red Wing	32	Zumbrota	4
Hastings	8	Morristown	3
Minneapolis	18	Waseca	8
Mankato	22	Delano	5
Albert Lea	10	Sleepy Eye	7
St. Paul	7	Winnebago City	6
Winona	13	Faribault	1
St. Peter	3	Cannon Falls	5
Lake City	1	Crow River	1
Owatonna	14	Fargo	2
New Ulm	9	Dundas	1
			191

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ANALYSES

Made in the Secretary's Office at Red Wing.

In each case the first line denotes parts per million (milligrammes per liter), the second line shows grains per American gallon (weighing 58372.2 grains).

	Date of Analysis.	Total Solids.	Dest. Matter.	Free NH3	Alb. NH3	Chlorine.	Nitrates
WELLS.							
1. Duluth	July 26, 79	.....	.....	.....	.....	30.	marked.
On Minnesota point.	"	.....	.....	.....	.....	1.75	
2. Duluth		.....	.....	.....	.....	43.	marked.
Dr. Smith's well		.....	.....	.....	.....	2.51	
3. St. Paul	Jan. 19. 80	488.	120.	.29	.07	5.	trace.
W. B. Dean's well		28.48	7.	.0169	.004	.2918	
4. Minneapolis	Oct. 28, 79.	756.	296.	.48	.18	73.	trace.
1123 S. 6th street		44.18	17.28	.028	.0105	4.26	
5. Minneapolis	Oct. 30, 79.	384.	140.	.36	.12	12.	trace.
400 9th street, s. e		22.41	8.17	.022	.007	.7	
6. Minneapolis	Oct. 30, 79.	1748.	856.	.36	.24	254.	marked.
1203 S. 3d street		102.03	49.96	.022	.014	14.82	
7. Minneapolis	Oct. 30. 79.	304.	76.	.30	.07	10.	trace.
5th st. & 10th ave. n.		17.74	4.43	.0175	.004	.5837	
8. Minneapolis	Dec. 18, 79.	428.	100.	.64	.09	10.	trace.
5th st. & 10th ave. n.		24.98	5.84	.0333	.0052	.5837	
9. Minneapolis	Dec. 18, 79.	792.	250.	1.56	.06	88.	trace.
1727 5th street, s. e		46.23	14.7	.091	.0035	5.136	
10. Minneapolis	Dec. 19, 79.	488.	124.	1.62	.30	11.	trace.
400 9th street, s. e		28.48	7.24	.0945	.0175	.642	
11. Minneapolis	Dec. 19, 79.	496.	172.	.18	.12	40.	trace.
311 15th ave. s		28.95	10.04	.0105	.007	2.335	
12. Minneapolis	Dec. 20, 79.	592.	220.	2.04	.20	55.	trace.
2½ st. & 18th ave. s.		34.55	12.84	.119	.0116	3.21	
13. Minneapolis	Mar. 10, 80.	288.	128.	.20	.18	2.5	trace.
Artesian well, Hen. I		16.81	7.47	.0116	.0105	.1459	
14. Minneapolis	Nov. 8, 80.	1072.	528.	.09	.07	54.	marked
5th st. & 10th ave. s.e.		62.57	30.82	.0052	.004	3.152	
15. Faribault	Aug. 4, 80.	372.	40.	.04	.03	6.	trace.
Shattuck school well		21.71	2.335	.0023	.00175	.35	
16. New Ulm	May 26, 80.	456.	100.	.03	.14	86.	trace.
Dr. Berry's well		26.72	5.837	.00175	.0082	3.85	
17. New Ulm	May 26, 80.	524.	208.	.08	.18	121.	trace.
Bobleter's well		30.58	12.14	.00467	.0105	7.06	
18. New Ulm	May 26, 80.	380.	140.	.12	.10	155.	marked.
Keisling's well		22.18	8.172	.007	.0058	9.047	
19. New Ulm	May 26, 80.	384.	136.	.04	.12	10.	trace.
Keller's well		22.41	7.938	.0023	.007	.5837	
20. New Ulm	May 26, 80.	376.	140	.09	.14	122.	trace.
Merchants' Hotel		21.95	8.172	.0052	.0082	7.121	
21. New Ulm	May 26, 80.	380.	144.	.24	.15	177.	trace.
Pennsylvania Hotel		22.18	8.4	.0014	.0087	10.33	
22. Nicollet co., Lafayette	May 25, 80.	460.	92.	.39	.12	32.	trace.
Sederquist's well		26.85	5.37	.0227	.007	1.867	
23. Nicollet county	May 25, 80.	416.	84.	.18	.15	9.	trace.
Blousso's well		24.28	4.9	.0105	.0087	.525	
24. Albert Lea	Jan. 6, 80.	692.	216.	.12	.05	45.	trace
No. 1		40.39	12.6	.007	.0029	2.626	
25. Albert Lea	Jan. 12, 80.	358.	84.	.02	.09	31.	slight.
No. 2		20.78	4.9	.0011	.0052	1.809	
26. Albert Lea	Jan. 6, 80.	364.	128.	.06	.09	12.	slight.
No. 3		21.25	7.47	.0035	.0052	.7	
27. Albert Lea	Oct. 12, 80.	500.	124.	.07	.04	3.	slight.
Bunker's well		29.18	7.24	.004	.0023	.1751	
28. Albert Lea	Oct. 12, 80.	725.	203.	.05	.15	242.	trace.
Hall's well		42.32	11.85	.0029	.0087	14.13	
29. Albert Lea	Oct. 14, 80.	481.	109.	.055	.03	49.	trace.
Hange's well		28.077	6.36	.0032	.0017	2.86	
30. Albert Lea	Oct. 15, 80.	475.	105.	.04	.03	21.	trace
Court house well		27.73	6.129	.0023	.00175	1.226	

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ANALYSES.—Continued.

	Date of Analysis.	Total Solids.	Dest. Matter.	Free NH3	Alb. NH3	Chlorine.	Nitrates.
WELLS.—Continued.							
31. Albert Lea	Oct. 15, 80.	422.	96.	.025	.03	5.	slight.
Blackmer's well		24.63	5.6	.0014	.00175	.2918	
32. Albert Lea	Oct. 15, 80.	557.	102.	.02	.04	102.	marked.
McMullen's well		32.51	5.954	.0011	.0023	5.954	
33. Delano	June 17, 80	800.	296.	.04	.12	45.	trace.
No. 2		46.69	17.28	.0023	.007	2.626	
34. Delano	June 17, 80	768.	316.	.09	.22	59.	trace.
No. 3		44.83	18.44	.0052	.0128	3.444	
35. Delano	June 18, 80	820.	340.	.04	.17	120.	trace.
No. 4		47.86	19.84	.0023	.0099	7.	
36. Delano	June 18, 80	1040.	364.	.24	.49	145.	marked.
No. 5		60.7	21.25	.014	.0286	7.464	
37. Delano	June 18, 80	1032.	496.	.10	.08	89.	marked.
No. 6		60.24	28.95	.0058	.0046	5.19	
38. Morristown	Aug. 9, 80.	....	.....	.32	.12	7.	trace.
Crawford's well		.....	.....	.0187	.007	.4086	
39. Morristown	Aug, 9, 80.	.....	.....	.06	.11	63.	trace.
Spaulding's well		.....	.....	.0035	.0064	3.677	
40. Morristown	Aug. 9, 80.	.....	.....	.30	.22	72.	marked.
Warren's well		.....	.....	.0175	.0128	4.2	
41. Waseca	July 19, 80	1204.	330.	.04	.07	89.	marked.
From well		60.28	19.26	.0023	.0041	5.19	
42. Waseca	July 19, 80	1156.	372.	.07	.12	116.	marked.
Niebel's well		67.48	21.71	.004	.007	6.77	
43. Waseca	July 19, 80	1175.	368.	.04	.10	174.	marked.
Strong & W's well		65.58	21.48	.0023	.0058	10.157	
44. Waseca	July 19, 80	10.96	328.	.02	.06	91.	marked.
Lewis well		63.97	19.14	.0011	.0035	5.31	
45. Waseca	Aug. 18, 80	1124.	364.	.09	.06	118.	marked.
Welch's well		65.61	21.25	.0052	.0035	6.888	
46. Waseca	Aug. 18, 80	.....	.....	.....	.....	12.	trace.
Christie's well		.....	.....	.....	.....	.7	
47. Waseca	Aug. 18, 80	.....	.....	.....	.....	26.	trace.
3		.....	.....	.....	.....	1.52	
48. Waseca	Aug. 18, 80	.....	.....	.....	.....	51.	marked.
Newell's well		.....	.....	.....	.....	2,977	
49. Hastings	Sep. 25, 80	552.	150.	.07	.06	27.	marked.
Irving School		32.22	8.75	.0041	.0035	1.576	
50. Hastings	Sep. 25, 80	620.	184.	.23	.31	154.	marked.
Wilcoxson's well		36.19	10.74	.0134	.018	8.989	
51. Winnebago City	July 26, 80	442.	122.	.08	.06	32.	medium.
Gillman's well		25.8	7.12	.0046	.0035	1.868	
52. Winnebago city	July 26, 80	428.	116.	.11	.12	23.	marked.
Brown's well		24.98	6.77	.0064	.007	1.342	
53. Winnebago City	July 30, 80	452.	124.	.08	.09	48.	marked.
3		25.38	7.24	.0046	.0052	2.8	
54. Winnebago City	July 30, 80	416.	116.	.32	.12	7.	trace.
Village well		24.28	6.77	0.187	.007	.408	
55. Winnebago City	July 31, 80	568.	244.	.02	.025	65.	marked.
Dodd's well		33.15	14.24	.001	.00146	3.79	
56. Winnebago City	July 30, 80	932.	132.	.56	.16	4.	traee.
Flowing well		54.4	7.7	.0327	.0093	.2335	
57. Cannon Falls	June 20,'80	396.	148.	.04	.07	18.	trace.
Dr. Conley's well		23.11	8.64	.0023	.0041	1.05	
58. Cannon Falls	June 20, 80	328.	148.	.08	.10	12.	trace.
Lind's well		19.14	8.64	.0046	.0058	.7	
59. Cannon Falls	June 20, 80	388.	140.	.24	.19	114.	marked.
Exchange Hotel		22.65	8.172	.014	.011	6.654	
60. Goodhue Co., Wanamingo Town	Sep. 16. 80	608.	132.	.06	.08	42.	trace.
Section 19		35.49	7.7	.0035	.0046	2.45	
61. Owatonna	June 1, 80	391.	90.	.08	.04	13.	trace.
Ellis' well		22.82	5.25	.0046	.0023	.76	
62. Owatonna	June 1, 80	536.	196.	.08	.10	18.	trace.
Hadley's well		31.29	11.44	.0046	.0058	1.05	
63. Owatonna	June 1, 80	384.	84.	.02	.03	14.	slight.
Central School		22.41	5.	.0011	.00175	.82	
64. Owatonna	June 1, 80	562.	177.	.07	.03	39.	trace.
Huneywell's well		33.8	10.33	.004	.00175	2.27	
65. Owatonna	June 1, 80	561.	182.	.04	.12	87.	trace.
Leary's well		32,75	10.62	.0023	.007	5.178	

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ANALYSES.—Continued.

	Date of Analysis.	Total Solids.	Dest. Matter.	Free NH3	Alb. NH3	Chlorine.	Nitrates.
WELLS.—Continued.							
66. Owatonna	June 1, 80	400.	92.	.06	.08	14.	slight.
Arnold House		23.35	5.37	.0035	.0046	.82	
67. Owatonna	June 1, 80	715.	213.	.21	.19	203.	marked.
Lamonia's well		41.73	12.43	.0122	.011	11.85	
68. Owatonna	June 1, 80	388.	84.	.04	.06	15.	slight.
Crocker House		22.65	5.	.0023	.0035	.81	
69. Owatonna	June 1, 80	626.	205.	.10	.36	138.	marked.
Pepper House		36.54	11.96	.0058	.021	8.05	
70. Lake City	June 10, 80	416.	168.	.08	.04	8.	trace.
Parkins' well		24.28	9.8	.0046	.0023	.467	
71. Sleepy Eye	Oct. 4, 80	596.	100.	.20	.13	25.	trace.
Hanson's well		34.79	5.84	.0116	.0076	1.46	
72. Sleepy Eye	Oct. 5, 80	516.	92.	.02	.075	5.	slight.
Barton's well		30.12	5.36	.0011	.0043	.292	
73. Sleepy Eye	Oct. 5, 80	584.	120.	.16	.04	82.	trace.
Conrad's well		34.09	7.	.0093	.0023	4.78	
74. Sleepy Eye	Oct. 6, 80	556.	120.	.19	.14	61.	medium.
Hill's well		32.45	7.	.011	.0082	3.56	
75. Sleepy Eye	Oct. 6, 80	480.	100.	.22	.10	24.	trace.
Montgomery's well		28.02	5.84	.0128	.0058	1.4	
76. Sleepy Eye	Oct. 6, 80	416.	88.	.05	.06	2.	slight.
Burnside well		24.28	5.136	.0029	.0035	.1167	
77. Sleepy Eye	Oct. 6, 80	420.	88.	.06	.05	4.	slight.
Eaton's well		24.51	5.136	.0035	.0029	.2335	
78. Zumbrota	July 7, 80	497.	189.	.12	.08	222.	trace.
Dane's well		29.	11.03	.007	.0046	12.66	
79. Zumbrota	July 7, 80	340.	123.	.07	.06	26.	trace.
Scofield's well		19.84	7.18	.0041	.0035	1.517	
80. Zumbrota	July 7, 80	316.	112.	.09	.04	5.	slight.
Barteau's well		18.44	6.54	.0052	.0023	.2918	
81. Winona	Jan. 5, 80	292.	136.	.15	.09	21.	trace.
Sen. Windom's well.		17.04	7.94	.0087	.0052	1.226	
82. Winona	Jan. 5, 80	360.	168.	.12	.10	28.	trace.
Water mains		21.01	9.8	.007	.0058	1.63	
83. Winona	Sep. 21, 80	344.	100.	.06	.08	16.	trace.
Water mains		20.	5.837	.0035	.0046	.934	
84. Winona	Jan, 5, 80	384.	192.	.12	.10	30.	trace.
Laird, N. & Co's mill		22.41	11.2	.007	.0058	1.75	
85. Winona	Sep. 21, 80	340.	116.	.16	.08	9.	trace.
Laird, N. & Co's mill		19.846	6.77	.0093	.0046	.525	
86. Winona	Sep. 21, 80	364.	156.	.18	.10	24.	trace.
L., N. & Co's pl. mill		21.25	9.1	.0105	.0058	1.4	
87. Winona	Jan, 5, 80	304.	76.	.08	.06	19.	trace.
Youman & H's mill.		17.745	4.43	.0046	.0035	1.109	
88. Winona	Sep. 21, 80	330.	92.	.10	.04	15.	trace.
Youman & H's mill.		19.26	5.37	.0058	.0023	.875	
89. Dundas	Nov, 16, 80	392.	72.	.20	.08	4.	slight.
Donaldson's well		22.88	4.2	.0116	.0046	.2335	
90. Red Wing	Aug. 13, 79	504.	124.	.42	.06	17.	trace.
St. James Hotel		29.42	7.24	.0245	.0035	.99	
91. Red Wing	Aug. 22, 79	352.	76.	.24	.12	8.	trace.
O. K. Simmon's well		20.55	4.43	.014	.007	.467	
92. Red Wing	July 22, 80	451.	143.	.03	.05	17.	marked.
Broad St. bet M.& L.		26.32	8.35	.00175	.0029	.99	
93. Red Wing	July 22, 80	460.	152.	.03	.07	24.	marked.
Northwestern Hotel		26.85	8.87	.00175	.0041	1.4	
94. Red Wing [195 ft deep	Aug. 12, 80	292.	.....	.....	.....	27.	
Art. well at depot,		17.04	.....	.....	.....	1.576	
95. Red Wing	Aug. 13, 80	352.	.....	.....	.....	45.	
" " 325 ft.		20.55	.....	.....	.....	2.62	
96. Red Wing	Aug. 14, 80	360.	.....	.....	.....	51.	
" " 444 ft.		21.01	.....	.....	.....	2.977	
97. Red Wing	Aug. 16, 80	340.	80.	.04	.02	51.	slight.
" " 444 ft.		19.84	4.67	.0023	.0011	2.977	
98. Red Wing	Aug. 20, 80	1308.	504.	.025	.05	206.	marked.
Svea Hotel		76.35	29.43	.0014	.0029	12.02	
99. Red Wing	Aug. 20, 80	1204.	480.	.03	.09	54.	marked.
4th and Potter st's		70.28	28.02	.00175	.0052	3.15	
100. Red Wing	Aug. 21, 80	1204.	488.	.03	.08	96.	marked.
5th and Potter st's		70.28	28.48	.00175	.0046	5.6	
101. Red Wing	Aug. 21, 80	1160.	464.	.04	.06	22.	trace.
7th and Potter st's		67.71	27.08	.0023	.0035	1.28	

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ANALYSIS.—Continued.

	Date of Analysis.	Total Solids.	Dest. Matter.	Free NH3	Alb. NH3	Chlorine.	Nitrates.
WELLS.—Continued.							
102. Red Wing.....	Aug. 30, 80	1192.	464.	.04	.04	17.	trace.
" " (Howe's)		69.58	27.08	.0023	.0023	.99	
103. Red Wing	Aug. 26, 80	872.	264.	.03	.06	20.	trace.
5th and Bush streets		50.9	15.41	.00175	.0035	1.167	
104. Red Wing	Aug. 26, 80	856.	264.	.025	.07	6.	trace.
6th and Bush streets		49.96	15.41	.0014	.0041	.35	
105. Red Wing	Aug. 27, 80	904.	272.	.03	.07	33.	trace.
Bush st., (Messer's)		52.77	15.87	.00175	.0041	1.926	
106. Red Wing.....	Aug. 30, 80	860.	204.	.03	.05	3.	slight.
Bush st., side of bluff		50.2	11.9	.00175	.0029	.1751	
107. Mankato.....	Nov. 1, 79	676.	284.	1,50	.27	74.	marked.
Open well, stoned...		39.46	16.58	.0875	.0157	4.32	
108. Mankato.....	Nov. 1, 79	460.	208.	.30	.09	29.	trace.
Open well, bricked..		26.85	12.14	.0175	.0052	1.693	
109. Mankato.....	Nov. 23, 80	516.	164.	.84	.12	25.	trace.
Open well, stoned...		30.12	9.57	.049	.007	1.459	
110. Mankato.....	July 19, 80	500.	80.	1.36	.26	2.	trace.
Flowing well.....		29.18	4.67	.0794	.0152	.1167	
LAKES.							
1. Lake Superior at Duluth	July 26, 79	152.	44.	.008	.024	2.	
		8.87	2.568	.0004	.0012	.1167	
2. Lake Phalen, near St. Paul	Feb. 2, 80	164.	40.	.44	.57	2.	trace.
		9.57	2.335	.0257	.0327	.1167	
3. Lake Phalen, taken from lake.....	Mch 4, 80	50.	30.	.25	.24	2.	trace.
		2.918	1.75	.0146	.014	.1167	
4. Lake Phalen, taken from lake.....	Mch 22, 80	96.	56.	.18	.42	1.5	trace.
		5.6	3.27	.0105	.0245	.0875	
5. L. Phalen, taken from a hydrant in St. Paul ..	Mch 23, 80	184.	60.	.12	.36	1,5	trace.
		10.74	3.5	.007	.021	.0875	
6. Lake Phalen, taken from lake.....	July 20, 80	140.	64.	.14	.28	3.5	marked
		8.17	3.73	.0082	.0163	.2042	test.
7. McKusick's Lake near Stillwater	July 1, 80	132.	68.	1,20	.20	3.	trace.
		7.7	3.97	.07	.0116	.1751	
7. Spring Lake, near Albert Lea.....	Oct. 14, 80	264.	80.	.05	.41	1.8	trace.
		15.41	4.669	.0029	.0239	.105	
SPRINGS.							
1. Public spring, Duluth..	July 19, 80	444.	116.	.186	.216	34.	7.20
		25.92	6.77	.0108	.0126	1.984	.42
2. St. Peter, near Insane Asylum.....	May 29, 80	532.	68.	.09	.23	3.	trace.
		31.05	3.97	.0052	.0134	.175	
3. St. Peter, from reservoir supplying Asylum....	May 29, 80	528.	64.	.02	.21	4.	marked.
		30.82	3.73	.0011	.0122	.2335	
4. St. Peter, from reservoir supplying Asylum....	Sep. 27, 80	428.	68.	.17	.20	4.	trace.
		24.98	3.97	.0099	.0116	.2335	
5. Vichy spring near Owatonna.....	May 26, 80	384.	80.	.025	.035	3.	trace.
		22.41	4.67	.00146	.0017	.1751	
6. Mineral spring near Owatonna.....	May 26, 80	378.	82.	.06	.06	3.5	trace.
		22.06	4.78	.0035	.0035	.2043	
7. Iron spring near Owatonna.....	May 26, 80	380.	84.	.32	.12	4.	trace.
		22.18	4.9	.0187	.007	.2335	
8. New Ulm, on Center st.	May 26, 80	464.	88.	.16	.10	29.	marked.
		27.07	5.13	.0093	.0058	1.693	
9. East Minneapolis, Chalybeate spring	Oct. 30, 79	312.	28.	.54	.06	6.	trace.
		18.21	1.63	.0315	.0035	.3502	
10. Cannon Falls, on bank of Cannon River	June 29, 80	320.	124.	.02	.07	8.	slight
		18.68	7.24	.0011	.0041	.4669	trace.
11. Stillwater, McKusick's spring	July 6, 80	200.	40.	.16	.04	4.	slight
		11.674	2.335	.0093	.0023	.2335	trace.
12. Stillwater, old spring in State Prison yard	July 6. 80	197.	42.	.10	.07	5.	trace.
		11.499	2.45	.0058	.004	.292	
13. Stillwater, new spring in State Prison yard.	July 6, 80	195.	38.	.08	.06	4.	trace.
		11.38	2.22	.0046	.0035	.2335	
14. Hastings, Indian spring	Sep. 25, 80	540.	144.	.07	.04	12.	trace.
		31.52	8.4	.004	.0023	.7	
15. Red Wing, Freeborn spring	Aug. 18, 79	888.	324.	.64	.06	145.	marked.
		51.83	18.91	.0373	.0035	8.464	
16. Red Wing, corner Bush and 4th streets	Aug. 19, 79	416.	108.	.24	.06	25.	trace.
		24.28	6.3	.014	.0035	1.459	
17. Red Wing, 3d street, at Webster's liv. stable.	Aug. 21, 79	544.	140.	.213	.12	19.	trace.
		31.75	8.17	.0124	.007	1.109	

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ANALYSES.—Continued.

	Date of Analysis.	Total Solids.	Dest. Matter.	Free NH_3	Alb. NH_3	Chlorine.	Nitrates.
CISTERN & SNOW WATERS							
1. Cistern, cor. Fulton and Levee st's, Red Wing	Aug. 27, 80	.....	.....	.02	.18	1.	none.
		.....	.....	.00116	.0105	.058	
2. Cistern on Main street, Red Wing	Aug. 20, 79	.....	.....	.48	.12	2.	trace.
		.....	.....	.028	.007	.1167	
3. Cistern, St. Paul	June 26, 80	.....	.....	.40	.32	11.	trace.
		.....	.....	.0233	.0187	.642	
4. Snow from roof in Red Wing, 10.20 A. M., thermom. 22 F.	Mch 13, 80			.76	.14	.....	
		.....	.....	.0443	.0082	.....	
5. Snow from mid. river op. Red Wing, 10.45 A. M., thermom. 22½ F.	Mch 13, 80			.18	.12	.....	
		.....	.....	.0105	.007	.....	
RIVERS.							
Mississippi River—							
1. ¾ mile above Minneapolis	Dec. 19, 79	268.	120.	.47	.12	2.	trace.
		15.64	7.	.0274	.007	.1167	
2. ½ mile above Minneapolis	Oct. 5, 80	248.	80.	.04	.11	2.	trace.
		14.47	4.07	.0023	.0064	.1167	
3. ¼ mile above Minneapolis	May 3, 80	164.	68.	.10	.32	2.5	trace.
		9.573	3.969	.0058	.0187	.1459	
4. At suspension bridge, Minneapolis	May 3, 80	180.	88.	.16	.36	3.	trace.
		10.507	5.1367	.0093	.021	.1751	
5. At suspension bridge, Minneapolis	Oct. 5, 80	252.	92.	.14	.10	3.	fair test.
		14.7098	5.37	.0082	.0058	.1751	
6. From a hydrant, Minneapolis	Oct. 28, 79	164.	52.	1.68	.30	3.	trace.
		9.573	3.035	.098	.0175	.1751	
7. From a hydrant, Minneapolis	Dec. 20, 79	224.	84.	1.36	.18	3.	trace.
		13.075	4.9	.0794	.0105	.1751	
8. From a hydrant, Minneapolis	May 1, 80	188.	72.	.16	.34	3.	trace.
		10.974	4.203	.0093	.0198	.1751	
9. From a hydrant, Minneapolis	Oct. 5, 80	256.	94.	.15	.11	3.	fair test.
		14.94	5.487	.0087	.0064	.1751	
10. Above St. Anthony F'ls & below water works.	Mch 15, 80	220.	88.	.16	.18	2.5	trace.
		12.84	5.137	.0093	.0105	.1459	
11. At Fort Snelling ferry	July 26, 79	272.	56.	2.40	.54	2.	
		15.87	3.27	.14	.0315	.1167	
12. Above St. Paul, (C., M. & St. P. R. R. bridge)	July 26, 79	272.	76.	3.84	.54	4.	
		15.877	4.436	.224	.0315	.233	
13. Below St. Paul	July 26, 79	324.	80.	14.40	4.50	3.	
		18.9	4.67	.84	.2626	.175	
14. Above Hastings	Sep. 27, 79	.....	.....	.48	.12	3.	trace.
		.....	.....	.028	.007	.1751	
15. At Hastings ferry	Sep. 27, 79	.....	.....	.56	.12	3.	trace.
		.....	.....	.0327	.007	.1751	
16. At Hastings ferry	Sep. 25, 80	244.	72.	.03	.09	3.	fair test.
		14.243	4.203	.00175	.0052	.1751	
17. Below Hastings	Sep. 10, 79	248.	72.	.72	.12	3.	trace.
		14.476	4.203	.042	.007	.1751	
18. Above Red Wing	Dec. 2, 79	172.	80.	.03	.18	3.	trace.
		10.04	4.669	.00175	.0105	.1751	
19. Above Red Wing	Apr. 27, 80	140.	84.	.22	.20	1.5	trace.
		8.172	4.903	.0128	.0116	.0875	
20. Above Red Wing	July 29, 80	190.	72.	.04	.18	2.5	good test
		11.09	4.1	.0023	.0105	.1459	
21. At Red Wing ferry	Dec. 3, 79	188.	96.	.07	.18	3.	trace.
		10.973	5.604	.0041	.0105	.1751	
22. At Red Wing ferry	Apr. 27, 80	152.	88.	.24	.21	1.5	trace.
		8.872	5.137	.014	.0122	.0875	
23. At Red Wing ferry	July 29, 80	192.	80.	.04	.23	2.5	good test
		11.207	4.67	.0023	.0134	.1459	
24. Below Red Wing	Apr. 28, 80	160.	92.	.25	.23	1.5	trace.
		9.339	5.37	.01459	.0134	.0875	
25. Below Red Wing	July 29, 80	192.	80.	.05	.27	2.5	good test
		11.207	4.67	.0292	.0157	.1459	
26. From the bay above Red Wing	July 29, 80	196.	44.	.08	.24	2.	trace.
		11.44	2.568	.0046	.014	.1167	
27. Above Winona	Feb. 7, 80	164.	48.	.24	.21	3.	trace.
		9.573	2.8	.014	.0122	.1751	
28. Above Winona	Sep. 21, 80	196.	80.	.08	.10	1.5	trace.
		11.44	4.67	.0046	.0058	.0875	

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ANALYSES.—Continued.

	Date of Analysis.	Total Solids.	Dest. Matter.	Free NH3	Alb. NH3	Chlorine.	Nitrates.
RIVERS.—Continued.							
29. Opposite Winona.....	Feb. 7, 80	160.	52.	.22	.20	3.	trace.
		9.339	3.035	.0128	.01167	.1751	
30. Below Winona.....	Sep. 21, 80	196.	84.	.12	.12	2.	trace.
		11.44	4.8	.007	.007	.1167	
31. Below Winona	Feb. 7, 80	164.	48.	.20	.28	3.	trace.
		9.573	2.8	.0116	.0163	.1751	
32. Crow River at Delano..	June 17, 80	250.	96.	.06	.23	26.	good test
		14.59	5.6	.0035	.0134	1.527	
33. Vermilion River near Hastings	Sep. 25, 80	248.	80.	.05	.11	2.	trace.
		14.47	4.67	.0029	.0064	.1167	
34. Little Cannon River at Cannon Falls.....	June 20, 80	340.	84.	.09	.15	2.5	trace.
		19.84	4.9	.0052	.0087	.1459	
35. Red River bet. Moorhead and Fargo.....	Oct. 27, 80	248.	60.	.08	.13	4.	trace.
		14.476	3.5	.0046	.0076	.2335	
36. Red River above Fargo	Oct. 27, 80	243.	55.	.04	.11	3.5	trace.
		14.184	3.2	.0023	.0064	.2043	
37. Zumbro River at Zumbrota	July 7, 80	298.	97.	.08	.10	3.	slight
		17.395	5.66	.0046	.0058	.1751	trace.
38. Maple Creek, near Owatonna.....	May 26, 80	404.	97.	.025	.28	3.5	trace.
		23.58	5.66	.00146	.016	.2043	
39. Straight River at Owatonna.....	June 11, 80	388.	84.	.05	.07	4.	trace.
		22.648	4.9	.0029	.0041	.2335	
40. St. Croix River, above Stillwater	July 6, 80	108.	44.	.08	.17	4.	slight
		6.3	2.57	.0046	.0099	.2335	trace.
41. St. Croix River, opposite Stillwater	July 6, 80	110.	47.	.07	.18	3.	trace.
		6.42	2.743	.004	.0105	.1751	
42. St. Croix River, below Stillwater	July 6, 80	115.	53.	.22	.12	3.	trace
		6.71	3.09	.0128	.007	1.751	
43. Basset's Creek, Minneapolis.....	May 1, 80	260.	100.	.96	.49	3.	good test
		15.17	5.837	.055	.0286	.1751	
44. Bassett's Creek, Minneapolis.....	Oct. 5, 80	288.	100.	.16	.20	3.	good test
		16.81	5.837	.0093	.0116	.1751	
Minnesota River—							
45. Above Mankato.....	Nov. 1, 79	388.	72.	.54	.12	4.	trace.
		22.65	4.2	.0315	.007	.2335	
46. Above Mankato.....	Apr. 5, 80	240.	72.	.30	.36	1.	trace.
		14.	4.2	.0175	.021	.058	
47. Above Mankato.....	July 19, 80	372.	124.	.08	.13	3.	trace.
		21.71	7.24	.0046	.0076	.1751	
48. Mankato (No. 1).....	Nov. 8, 80	432.	44.	.02	.11	2.	
		25.2168	2.5684	.00119	.0064	.1167	
49. Opposite City Hall, Mankato	Nov. 8, 79	412.	100.	.66	.18	4.	trace.
		24.05	5.837	.0385	.0105	.2335	
50. Opp. City Hall, Mankato.....	Apr. 5, 80	252.	88.	.32	.36	2.	trace.
		14.7	5.136	.0187	.012	.1167	
51. Opp. City Hall, Mankato	July 19, 80	370.	126.	.09	.20	3.	trace.
		21.59	7.35	.0052	.0116	.1751	
52. Mankato (No. 2).....	Nov. 8, 80	448.	48.	.025	.13	3.	
		26.1507	1.8018	.0014	.0076	.1751	
53. At "crib," Mankato	Nov. 1, 79	404.	128.	.42	.06	4.	trace.
		23.58	7.47	.0245	.0035	.2335	
54. At "crib," Mankato	Apr. 5, 80	236.	76.	.24	.20	1.5	trace.
		13.77	4.43	.014	.0116	.0875	
55. At "crib," Mankato....	July 19, 80	372.	126.	.07	.26	3.	trace.
		21.71	7.355	.004	.015	.1751	
56. Mankato.....	Nov. 12, 80	450.	53.	.04	.12	3.	
		26.2675	3.094	.0023	.007	.1751	
57. Below Mankato.....	Nov. 1, 79	412.	120.	.42	.36	5.	trace.
		24.05	7.004	.0245	.021	.2335	
58. Below Mankato	Apr. 5, 80	256.	96.	.48	.36	4.5	trace.
		14.94	5.6	.028	.021	.2627	
59. Below Mankato	July 19, 80	378.	130.	.08	.32	3.5	trace.
		22.06	7.59	.0046	.0187	.2043	
60. Mankato (No. 3).....	Nov. 12, 80	450.	53.	.04	.12	3.	
		26.2675	3.094	.0023	.007	.1751	
61. At Ft. Snelling ferry...	July 26, 79	348.	100.	.08	.30	11.	good test
		20.31	5.837	.0046	.0175	.642	

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Average of Wells.

	Total Solids.	Dest. Matter.	Free NH_3	Album. NH_3	Chlorine.
1. Duluth, 2 wells					36.5
					2.135
2. St. Paul, 1 well	488.	120.	.29	.07	.1
	28.48	7.	.0169	.004	.298
3. Minneapolis, 12 wells	659.	253.5	.66	.1425	51.
	38.467	14.797	.0385	.0063	3.02
4. Faribault, 1 well	372.	40.	.04	.03	6.
	21.7	2.3	.0023	.0017	.35
5. New Ulm, 8 wells	424.5	130.	.146	.137	86.5
	24.78	7.59	.0085	.0079	5.05
6. Albert Lea, 9 wells	506.	129.7	.05	.06	56.6
	29.5	7.57	.0029	.0035	3.3
7. Delano, 5 wells	892.	362.4	.102	.216	91.6
	52.07	21.15	.0059	.0126	5.35
8. Waseca, 5 wells	1151.	352.4	.052	.082	117.6
	67.18	20.57	.003	.0048	6.86
9. Hastings, 2 wells	586.	167.	.15	.185	90.5
	34.2	9.75	.0087	.01	5.28
10. Winnebago City, 6 wells	539.7	142.3	.195	.096	29.8
	31.5	8.3	.011	.0056	1.74
11. Cannon Falls, 4 wells	430.	142.	.105	.11	46.5
	25.1	8.29	.0061	.0064	2.7
12. Owatonna, 9 wells	507.	147.	.077	.112	60.
	29.59	8.58	.0046	.0065	3.5
13. Lake City, 1 well	416.	168.	.08	.04	8.
	24.28	9.8	.0045	.0023	.467
14. Sleepy Eye, 7 wells	509.7	101.	.13	.085	29.
	29.75	5.89	.0076	.0049	1.69
15. Zumbrota, 3 wells	347.6	141.3	.093	.06	84.3
	20.29	8.25	.0054	.0035	4.92
16. Winona, 8 wells	339.7	127.	.12	.08	20.2
	19.83	7.4	.007	.0046	1.18
17. Dundas, 1 well	392.	72.	.20	.08	4.
	22.88	4.2	.016	.0046	.2335
18. Red Wing, 17 wells	745.4	248.2	.068	.056	41.
	43.5	14.48	.0039	.0032	2.39
19. Mankato, 12 wells	574.8	133.7	.39	.207	28.6
	33.55	7.8	.023	.012	1.67
20. Brainerd, 3 wells	486.6	94.6	.526	.206	60.3
	28.4	5.52	.0307	.012	3.52
21. Morristown, 3 wells			.23	.15	47.
			.013	.0087	2.74
General Averages in the State:					
Average of 114 wells	584.46	180.5	.202	.113	51.7
	34.11	10.52	.0118	.0066	3.02
Average of lakes, 8 specimens, 4 lakes.	147.7	55.2	.298	.313	2.16
	8.62	3.22	.0174	.0183	.126
Average of springs, 17 specimens analyzed	420.6	96.3	.182	.108	10.5
	24.55	5.62	.0106	.0063	.61
Average of rivers, 64 specimens, 11 rivers	259.9	78.6	.542	.274	4.05
	15.17	4.588	.0316	.016	.236
Average of 76 wells	496.	179.	.13	.09	18.9
	29.06	9.31	.012	.005	1.149

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Comparative Analyses of Wells and Springs.—Results in Grains per gallon.

	Total Solids.	Dest. Matter.	Free Amm.	Alb. Amm.	Chlorine
Owatonna—					
Average of 9 wells	29.59	8.58	.0045	.0065	3.5
Bored well in park	25.146	3.31	.0097	.0048	0.5848
Average of 3 springs	22.13	4.78	.0078	.0040	0.2043
New Ulm—					
Average of 6 wells	24.34	8.441	.0058	.0081	6.332
Analysis of spring	27.07	5.13	.0093	.0058	1.693
Minneapolis—					
Average of 10 wells	41.21	16.13	.0443	.0084	9.262
Analysis of artesian well	16.81	7.42	.0116	.0105	0.1459
Chalybeate spring	18.21	1.63	.0315	.0035	0.3502
Cannon Falls—					
Average of 4 wells	25.1	8.29	.0061	.0064	2.7
Spring on Cannon River	18.68	7.24	.0011	.0041	0.4669
Hastings—					
Average of 2 wells	34.20	9.74	.0087	.0107	5.282
Indian Springs	31.52	8.4	.004	.0023	0.7
Red Wing—					
Average of 13 wells	50.80	17.50	.0044	.004	2.34
Artesian well	19.84	4.67	.0023	.0011	3.977
Average of 3 springs	35.95	11.12	.0212	.005	3.674
Final average—Of wells	34.25	8.53	.0123	.0073	4.902
—Of artesian wells	20.59	5.13	.0078	.0055	1.2359
—Of springs	25.59	6.36	.0125	.0041	1.1814

Average of Rivers.

	Total Solids.	Dest. Matter.	Free Amm.	Alb. Amm.	Chlorine.
1. Mississippi River, 34 samples	209.2	72.9	.848	.339	3.98
	12.21	4.25	.049	.0198	.232
2. Minnesota River, 17 samples	365.9	91.5	.229	.217	3.5
	21.36	5.34	.0133	.0126	.204
3. Four samples of water from the Minneapolis mains	208.	75.5	.837	.232	3.
	12.14	4.4	.0488	.0135	.175

NOTE.—Especially bad waters are wells No. 6, 21, 45, 59, 67, 78, 98 and 107, and spring No. 15.

Especially good waters are wells No. 15, 31, 72, 105, and spring No. 5.

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REPORT ON
THE METEOROLOGY
OF MINNESOTA FOR 1879-80.

BY W. H. LEONARD, M. D.

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METEOROLOGY OF MINNESOTA.

MINNEAPOLIS, Nov. 1880.

C. N. Hewitt, M. D.:

DEAR DOCTOR.—In making the reports for 1879–80 the same course has been pursued as in former reports. The mean temperature and humidity, and the highest and lowest monthly, are given for each station from November 1, 1878, to October 31, 1880; also means for the seasons for two years, and some comparisons of temperature and precipitation of secctions of the United States.

The object to be attained by this committee, and that which led to its appointment, was to observe the effect of climate upon prevalent diseases, especially those of the respiratory organs. Certain epidemics are traced to unsanitary local conditions. What effect atmospheric influences have in producing epidemics is not well understood. Some observations have been made by medical gentlemen, but they have not been specific enough to be reliable. However, such observations should be instituted in every town in the State, and there is no doubt but the facts thus adduced would be of great importance.

Examples may be mentioned in this connection. At Minnneapolis cholera infantum prevailed during the month of July, 1879, to an alarming extent, the mortality being thirty-four for two months. In August it was much less, being only sixteen. The temperature for the months was about the same, but there were warmer days during August than in July. The rainfall in July was six inches, while in August it was only one inch. The sanitary condition of the city was considered about the same for the two months. May not the difference in rainfall have something to do in the production of diarrhœal diseases? Dr. Chas. Berry, of New Ulm, observes the effect of a heavy rainfall in Sept., 1880, in the epidemic of diphtheria, then prevailing. The weather was very hot, with a bad sanitary condition of the city. The heavy rain cleared the atmosphere of dust and strong odors; the epidemic was checked, and as the cool weather came on did not resume its former virulence. The rerults of these examples were different—one producing a diarrhœal epiddemic, the other checking a present one of diphtheria. Why this difference? The answer to this and kindred questions are to be found in careful and extended meteorological observations by faithful medical men. The positive and negative electric condition of the atmosphere and ozone are to be considered. If such observations could be made in different localities at the same time, by reliable medical observers, such questions might be answered. I am again under obligations to the gentlemen who have furnished the data for this report. The following is a list of their names and stations:

S. Marlatt, Esq., St. Cloud; Solomon Blood, M. D., Owatonna; Wm. Cheney, Minneapolis; W. H. Pratt, M. D., Stillwater; J. H. James, M. D., St. Peter; Franklin Staples, M. D., Winona; C. N. Hewitt, M. D., Red Wing, and J. E. Bowers, M. D., Rochester. Also there have been kindly furnished reading

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from the U. S. A. signal service stations in the State, viz: Serg. O. S. M. Conc. St. Paul,; Sergt. D. B. Conges, Duluth, and Sergt. H. Bessant, Breckenridge; being in all eleven stations. The comparisons of temperature and precipitation have been taken from signal service U. S. A.

W. H. LEONARD.

COMPARISON OF AVERAGE PRECIPITATION.

	1878.		1879.									
	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.
Minnesota	0.75	0.73	0.36	1.00	1.27	0.68	5.55	3.48	6.63	1.82	2.76	2.67
New England	5.44	5.53	2.41	3.00	4.40	4.68	1.65	4.84	4.86	3.79	2.85	1.47
Gulf States	5.35	6.45	3.53	2.60	1.96	6.28	3.20	3.13	5.70	8.49	4.47	4.50
Ohio Valley	4.06	4.04	2.33	2.15	4.14	2.43	2.40	4.59	3.76	7.78	3.34	1.45
Upper Missouri Valley	0.25	0.78	0.19	0.59	0.81	1.48	3.01	5.15	5.90	2.18	1.45	0.84
Pacific Coast	0.28	1.07	3.53	2.97	4.42	1.24	1.18	0.06	0.00	0.01	0.00	0.75

COMPARISON OF AVERAGE TEMPERATURES.

	1878.		1879.									
	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.
Minnesota	36.5	17.1	12.8	12.4	29.6	46.8	57.5	66.1	72.0	69.1	56.5	....
New England	40.3	30.3	20.6	21.3	31.2	40.7	56.4	61.7	69.3	65.2	58.8	54.8
Gulf States	60.2	48.9	46.1	49.8	61.7	65.2	74.5	79.3	83.4	78.5	76.1	69.5
Ohio Valley	48.0	32.1	33.3	35.0	48.5	55.4	68.7	73.4	80.3	73.2	64.8	63.7
Upper Mississippi Valley	37.5	14.7	18.2	21.3	37.1	51.9	63.9	70.2	76.2	73.4	61.1	53.8
Pacific Coast	53.6	46.9	48.6	54.1	56.7	55.9	55.9	59.4	58.0	59.6	60.5	60.1

ST. CLOUD, 1878 AND 1879.

	Highest Temp.	Lowest Temp.		Highest Temp.	Lowest Temp.
November	64°	12°	May	78°	36°
December	43°	—12°	June	87°	51°
January	45°	—26°	July	93°	60°
February	30°	—30°	August	84°	55°
March	65°	3°	September	71°	40°
April	76°	14°	October	84°	18°

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ST. PAUL, 1878 AND 1879.

	Highest Temp.	Lowest Temp.		Highest Temp.	Lowest Temp.
November	64°	15°	May	86°	35°
December	44°	—13°	June	91°	44°
January	49°	—26°	July	92°	54°
February	35°	—22°	August	92°	48°
March	68°	0	September	78°	36°
April	81°	13°	October	87°	17°

DULUTH, 1878 AND 1879.

November	53°	13°	May	80°	31°
December	38°	—14°	June	85°	39°
January	45°	—28°	July	91°	49°
February	34°	—26°	August	88°	49°
March	62°	—14°	September	76°	30°
April	69°	7°	October	78°	17°

MINNEAPOLIS, 1878 AND 1879.

November	65°	15°	May	82°	37°
December	41°	—13°	June	86°	50°
January	45°	—25°	July	89°	59°
February	33°	—24°	August	93°	52°
March	67°	0°	September	78°	35°
April	79°	13°	October	86°	18°

WINONA, 1878 AND 1879.

November	60°	18°	May	..	..
December	40°	—12°	June	..	..
January	45°	—24°	July	..	..
February	50°	—22°	August	..	..
March	..	..	September	..	..
April	..	..	October	..	..

ST. PETER, 1878 AND 1879.

November	67°	16°	May	..	..
December	42°	—6 °	June	..	..
January	47°	—24°	July	..	..
February	..	..	August	..	..
March	..	..	September	78°	35°
April	..	..	October	88°	15°

OWATONNA, 1878 AND 1879.

November	61°	17°	May	84°	36°
December	45°	—11°	June	86°	47°
January	45°	—26°	July	89°	56°
February	36°	—21°	August	88°	54°
March	67°	— 2°	September	78°	35°
April	83°	13°	October	86°	17°

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STILLWATER, 1878 AND 1879.

	Highest Temp.	Lowest Temp.		Highest Temp.	Lowest Temp.
November	57°	25°	May	86°	39°
December	42°	—12°	June	89°	55°
January	46°	—23°	July	93°	65°
February	35°	—15°	August	95°	55°
March	63°	1°	September	83°	42°
April	90°	22°	October	88°	23°

BRECKENRIDGE. 1878 AND 1879.

November	59°	3°	May	81°	28°
December	40°	—17°	June	92°	39°
January	47°	—32°	July	91°	48°
February	39°	—34°	August	92°	44°
March	69°	—24°	September	77°	29°
April	77°	4°	October	89°	13°

RED WING, 1868 AND 1879.

November	..	..	May	..	..
December	..	..	June	..	..
January	..	..	July	..	..
February	..	..	August	87°	53°
March	..	..	September	85°	35°
April	..	..	October	88°	17°

ROCHESTER, 1878 AND 1879.

November	..	..	May	..	..
December	..	..	June	..	..
January	..	..	July	..	..
February	..	..	August	91°	54°
March	..	..	September	85°	35°
April	..	..	October	86°	18°

TABULAR VIEW OF SEASONS.

	Autumn of 1878		Winter of 1878-9		Spring of 1879.		Summer of 1879	
	Mean Temperature.	Mean Humidity.	Mean Temperature.	Mean Humidity.	Mean Temperature.	Mean Humidity.	Mean Temperature.	Mean Humidity.
St. Cloud	46.72	68.56	14.89	72.31	44.73	68.22	67.91	71.69
St. Paul	48.40	65.30	17.03	74.83	48.80	57.63	70.53	66.76
Duluth	45.60	72.36	14.40	75.30	38.30	72.80	64.83	70.23
Minneapolis	46.45	72.13	13.37	67.20	45.34	64.83	69.44	71.00
Winona	.....	.....	16.35	.....	.....	.....	.....	.....
St. Peter	46.70	74.18	.....	.....	.....	.....	.....	.....
Owatonna	45.65	65.00	13.76	62.16	44.80	56.43	68.68	71.89
Stillwater	49.71	62.18	17.80	62 63	48.81	54.30	74.26	68.55
Breckenridge	42.46	74.13	6.26	84.26	41.66	67.73	67.70	71.06

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TABULAR VIEW OF MEANS.

	1878. NOVEMB.		1878. DECEMB.		1879. JANUA'Y		1879. FEBRU'Y		1879. MARCH.		1879. APRIL.		1879. MAY.		1879. JUNE.		1879. JULY.		1879. AUGUST.		1879. SEPTEMB		1879. OCTOBER		Annual Mean Temperature.	Annual Mean Humidity.
	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.		
St. Cloud	36.39	66.73	21.65	68.73	12.48	72.59	10.54	75.61	29.29	71.16	47.76	62.80	57.16	70.72	64.71	71.07	71.19	72.64	67.85	71.38	54.46	67.09	54.70	68.51	44.01	69.91
St. Paul	38.30	66.20	19.30	74.30	16.60	79.20	15.20	71.00	33.10	62.40	50.00	47.20	63.30	63.30	67.90	64.00	73.50	68.40	70.20	67.90	57.10	65.50	57.20	61.40	41.80	65.90
Duluth	36.70	72.50	17.70	75.00	14.30	73.40	11.20	77.50	27.10	73.90	39.30	69.30	48.50	75.20	59.90	68.80	67.80	72.10	67.10	69.80	54.10	71.80	50.80	73.80	41.20	72.75
Minneapolis	35.97	72.00	15.93	72.90	12.76	62.20	11.42	66.50	29.90	71.00	48.42	57.50	57.72	66.00	66.67	67.20	72.42	74.00	69.23	71.80	55.51	76.40	56.09	66.60	44.33	68.67
Winona	20 days 37.02	12 days 77.63	29 days 17.96	.....	13.30	.....	17.81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Peter	37.30	78.37	15.62	69.60	12.60	10 da 64.61	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	56.84	72.51	56.79	69.74	.....	.....
Owatonna	35.03	63.07	15.07	57.40	12.36	46.52	13.85	52.57	31.17	59.03	44.65	49.17	58.59	61.09	65.75	69.21	71.84	73.08	68.46	73.38	55.43	66.01	55.15	63.61	43.94	61.17
Stillwater	39.68	63.86	20.96	60.08	16.05	60.01	16.40	61.81	32.17	56.24	52.12	46.92	62.14	59.75	72.13	66.41	76.71	70.18	73.95	69.07	64.69	64.64	60.40	61.68	48.95	62.22
Breckenridge	32.80	79.00	10.60	83.80	5.20	84.80	3.00	84.20	24.50	74.80	46.00	59.00	55.50	69.40	65.80	67.70	70.88	71.70	66.50	73.80	52.90	66.50	53.30	61.50	40.57	73.01
Red Wing	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69.67	72.74	57.40	72.60	57.50	68.90	.....	.....
Rochester	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69.14	67.40	56.99	66.88	52.90	67.00	.....	.....
Average of the Monthly Means.	36.57	71.04	17.12	70.22	12.85	68.66	12.42	69.88	29.60	66.93	46.89	55.98	57.55	66.49	66.12	67.77	72.03	71.72	69.12	70.80	56.54	68.99	55.48	66.27	43.54	67.66

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COMPARISON OF AVERAGE PRECIPITATION.

	1879.		1880.									
	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.
Minnesota	0.92	2.31	0.76	0.68	1.63	1.89	5.19	7.21	3.00	4.00	1.62	2.24
New England	3.25	4.05	3.23	3.22	3.50	3.16	1.70	1.79	4.62	4.25	2.97	4.04
Gulf States	3.01	3.75	2.03	4.14	7.74	5.63	5.19	4.47	5.96	3.93	7.37	3.32
Ohio Valley	3.94	6.41	4.85	4.20	4.01	4.68	4.84	5.92	2.72	3.54	2.81	4.29
Upper Missouri Valley	0.20	2.31	0.46	....	0.82	2.02	3.40	3.12	2.17	3.13	0.85	1.02
California Coast	3.79	5.38	1.42	1.68	1.85	9.78	0.97	0.00	0.00	0.00	0.00	3.64

COMPARISON OF AVERAGE TEMPERATURES.

	1879.		1880.									
	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.
Minnesota	35.0	22.7	36.8	31.5	36.8	38.0	57.7	63.9	69.6	67.0	54.9	43.7
New England	....	28.0	31.4	28.6	30.3	43.9	59.2	66.2	71.1	67.7	62.6	50.2
Gulf States	59.4	53.7	58.8	54.2	60.1	67.5	75.5	78.9	80.7	80.0	75.3	63.8
Ohio Valley	48.8	42.3	49.0	43.0	46.4	58.9	71.3	74.8	76.6	76.6	66.4	56.7
Upper Missouri Valley	33.6	9.6	23.7	....	27.2	43.6	62.8	68.8	72.4	64.8	58.8	40.8
California Coast	54.6	49.6	47.8	48.5	48.8	54.9	62.0	67.0	72.0	64.8	67.4	56.2

ST. CLOUD, 1879 AND 1880.

	Highest Temp.	Lowest Temp.		Highest Temp.	Lowest Temp.
November	57°	— 3°	May	89°	45°
December	37°	—38°	June	87°	50°
January	42°	—12°	July	89°	55°
February	41°	—23°	August	93°	52°
March	52°	—14°	September	90°	39°
April	72°	20°	October	74°	20°

ST. PAUL, 1879 AND 1880.

November	61°	11°	May	91°	40°
December	40°	—39°	June	88°	47°
January	48°	—12°	July	93°	52°
February	59°	—18°	August	98°	51°
March	62°	—17°	September	90°	36°
April	79°	22°	October	78°	22°

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DULUTH, 1879 AND 1880.

	Highest Temp.	Lowest Temp.		Highest Temp.	Lowest Temp.
November	56°	0°	May	86°	33°
December	38°	—34°	June	89°	40°
January	40°	—19°	July	89°	51°
February	52°	—22°	August	85°	51°
March	55°	—18°	September	82°	37°
April	65°	14°	October	72°	24°

MINNEAPOLIS, 1879 AND 1880.

November	64°	6°	May	87°	44°
December	35°	—38°	June	85°	52°
January	48°	— 6°	July	90°	57°
February	54°	—19°	August	94°	54°
March	56°	— 8°	September	86°	36°
April	74°	22°	October	78°	20°

WINONA, 1879 AND 1880.

November	..	..	May	89°	52°
December	..	..	June	89°	52°
January	..	..	July	98°	56°
February	..	..	August	98°	56°
March	58°	— 1°	September	88°	37°
April	78°	28°	October	73°	26°

ST. PETER, 1879 AND 1880.

November	62°	6°	May	88°	44°
December	36°	—38°	June	88°	56°
January	57°	— 6°	July	90°	55°
February	56°	—18°	August	95°	54°
March	60°	1°	September	87°	36°
April	77°	24°	October	..	..

OWATONNA, 1879 AND 1880.

November	62°	3°	May	88°	44°
December	39°	—38°	June	86°	52°
January	56°	— 7°	July	90°	55
February	53°	—15°	August	90°	53°
March	56°	—13°	September	85°	36°
April	80°	23°	October	79°	18°

STILLWATER, 1879 AND 1880.

November	64°	12°	May	90°	50°
December	44°	—13°	June	91°	52°
January	48°	—20°	July	95°	64°
February	50°	—15°	August	100°	60°
March	65°	—10°	September	89°	45°
April	75°	30°	October	85°	28°

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BRECKENRIDGE, 1879 AND 1880.

	Highest Temp.	Lowest Temp.		Highest Temp.	Lowest Temp.
November	44°	— 4°	May	88°	33°
December	35°	—40°	June	87°	37°
January	42°	—28°	July	91°	47°
February	49°	—28°	August	95°	41°
March	54°	—30°	September	81°	25°
April	80°	13°	October	84°	15°

RED WING, 1879 AND 1880.

November	62°	12°	May	..	..
December	..	..	June	..	..
January	..	..	July	91°	55°
February	..	..	August	93°	55°
March	..	..	September	87°	54°
April	..	..	October	70°	28°

ROCHESTER, 1879 AND 1880.

November	63°	10°	May	84°	48°
December	41°	—36°	June	85°	52°
January	60°	—10°	July	89°	57°
February	54°	—19°	August	96°	55°
March	57°	— 8°	September	89°	34°
April	76°	27°	October	82°	21°

TABULAR VIEW OF SEASONS.

	Autumn of 1879		Winter of '79-80		Spring of 1880.		Summer of 1880	
	Mean Temperature.	Mean Humidity.	Mean Temperature.	Mean Humidity.	Mean Temperature.	Mean Humidity.	Mean Temperature.	Mean Humidity.
St. Cloud	46.13	63.68	13.73	65.51	43.68	65.32	68.42	69.22
St. Paul	48.96	65.46	17.63	67.76	45.83	61.50	69.70	69.10
Duluth	44.90	73.20	15.30	74.26	37.00	74.86	62.90	74.46
Minneapolis	37.17	71.06	16.42	64.76	44.11	63.56	68.91	72.66
Winona					48.39	62.46	72.72	68.29
St. Peter	38.26	71.05	15.73	60.64	45.39	67.78	69.93	72.25
Owatonna	46.86	63.99	17.63	57.08	44.20	59.73	68.18	71.13
Stillwater	39.83	54.73	21.60	42.12	49.30	59.02	74.59	60.84
Breckenridge	44.16	68.10	5.96	96.40	37.73	77.00	66.66	72.70
Red Wing	49.30	70.30						
Rochester	47.17	69.06	19.46	82.15	35.32	70.02	69.08	72.25

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TABULAR VIEW OF MEANS.

	1879. NOVEMB.		1879. DECEMB.		1880. JANUA'Y.		1880. FEBRU'Y		1880. MARCH.		1880. APRIL.		1880. MAY.		1880. JUNE.		1880. JULY.		1880. AUGUST.		1880. SEPTEMB		1880. OCTOBER			
	Monthly Mean Temperature.	Monthly mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Annual Mean Temperature.	Annual Mean Humidity.
St. Cloud	29.33	64.14	6.84	69.91	19.51	28 days 63.62	14.88	63.91	23.81	64.82	41.87	65.58	62.37	65.58	66.83	71.80	70.84	66.00	67.59	69.88	57.78	66.99	44.83	65.81	42.20	66.50
St. Paul	32.60	66.50	11.90	66.80	20.10	71.40	20.90	65.10	29.20	63.60	45.20	59.30	63.10	61.60	68.00	67.70	71.60	71.00	69.50	68.60	58.90	64.60	45.70	63.00	44.72	65.76
Duluth	29.90	74.00	8.20	74.10	22.40	76.40	15.80	72.30	21.40	70.70	38.40	71.20	51.20	75.70	59.70	80.60	65.00	69.00	64.00	73.80	54.90	67.10	43.30	74.00	39.47	73.82
Minneapolis	29.91	70.20	8.26	60.50	23.22	71.00	17.80	62.80	26.57	66.90	43.48	61.10	62.29	62.70	67.32	70.50	70.90	70.20	68.51	77.30	57.81	69.40	43.26	70.90	43.19	67.79
Winona	.....	.....	.....	.....	.....	.....	.....	.....	23 days 29.95	21 days 70.85	47.04	59.06	68.19	57.47	71.77	71.80	74.47	66.55	28 days 71.93	27 days 66.54	29 days 61.56	69.30	46.06	64.27	58.87	65.73
St. Peter	31.15	70.92	3.97	43.21	24.11	64.96	19.12	73.75	28.02	77.46	44.55	68.42	63.62	57.48	68.47	73.94	71.59	71.59	69.73	71.23	58.52	71.46	.....	.....	43.90	67.67
Owatonna	30.01	62.36	8.93	47.41	24.25	63.58	19.71	60.26	26.98	61.16	43.49	59.38	62.14	58.65	66.70	73.82	69.90	70.03	67.94	69.55	57.22	65.05	47.19	58.11	43.70	62.53
Stillwater	34.42	37.88	15.18	20.54	26.51	51.22	23.13	54.60	32.29	50.92	48.02	61.63	67.59	64.51	72.86	65.05	76.59	63.57	74.34	53.92	64.88	49.94	52.23	47.05	49.00	51.73
Breckenridge	26.30	77.30	3.00	98.60	11.60	95.70	9.30	94.90	15.40	90.80	37.50	75.00	60.30	65.20	65.50	75.30	69.70	69.40	64.80	73.40	54.10	70.00	42.20	70.40	38.30	79.66
Red Wing	33.10	69.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.60	71.89	67.45	73.35	67.75	74.82	44.85	71.71	56.95	72.25
Rochester	31.64	73.30	11.18	77.84	26.76	84.64	20.55	83.98	29.32	79.70	44.27	67.95	62.38	63.15	67.47	74.74	70.23	74.34	69.55	67.71	58.17	85.31	45.09	68.34	44.70	75.08
Average of the Monthly Means	30.83	66.61	8.26	62.10	22.05	71.39	17.85	70.17	26.29	69.69	41.38	64.86	59.31	63.20	66.46	72.52	71.12	69.41	68.66	70.61	59.59	68.36	45.47	65.36	45.90	67.95

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HEALTH OF PUPILS

IN

THE PUBLIC SCHOOLS

IN MINNESOTA.

REPORT FOR 1879-80 TO

STATE BOARD OF HEALTH.

BY THE SECRETARY.

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HEALTH OF PUPILS IN PUBLIC SCHOOLS.

Herewith are submitted all the data upon this question which I have been able to collect since the last report. In the University the examination has been regular and thorough. I have had there the hearty co-operation of regents, faculty and students alike. Plans are now perfecting for a gymnasium and other facilities for physical culture which will give a great impetus to this neglected department of education.

I am glad to report an increasing interest in vocal culture among the students under the genial guidance of Prof. Leib. Looked at simply as a kind of gymnastic this exercise cannot but be of the greatest benefit. At the State teachers' institute in 1879 I distributed a large number of blanks for physical examination to teachers of public schools, but all the returns as yet received are reported here. There are partial returns for St. Paul high school; a very interesting series for the common schools of Ramsey county by county superintendent Hendrickson, and the vital statistics of the Wasioja Methodist Seminary, by its principal, Prof. Paine. I do not despair of getting fuller returns hereafter, and shall not remit efforts in that direction.

Popular opinion will yet demand more knowledge of hygiene on the part of teachers in our public schools, and better instruction in matters of health. The fault is not entirely with the teachers. Time and patience will yet enable them to secure for their pupils more knowledge of the laws of health and of the means of preventing ill-health, acute sickness, and premature death. Teachers are learning that the average text-book in anatomy and physiology is of little use to this end. Some of them are already availing themselves of the opportunities constantly occurring to impress sanitary truth, by precept and example, in the every day experience of the school. No more practical way, in the absence of a recognized place and method for such study in the regular order of the school, is now possible. The time is not far off when practical hygiene will be taught in teachers' institntes and made a prerequisite to a teacher's certificate.

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Teachers should be more active than at present in co-operating with the health authorities of the districts where they teach. Intelligent co-operation in such work is as much their duty as that of anyother educated member of the community in which they live. The literature of the subject is abundant and cheap. If they studied it for no other purpose than their individual improvement, it would be of the greatest advantage to them; if as a means of recreation and as a variety to their routine work, it would "pay."

It is proper, to state the method used in collecting the health data at the University. I submit the blank in use. This is printed upon slips, one of which is filled for each student, and afterwards copied upon the permanent record. The apparatus necessary are:

Scales.
A measure for height, divided into fractions of an inch.
A spirometer. The gas metter patern is the one used at the University, West Point and the Naval School at Annapolis.
A series of Snellin's test type.
A tape measure.

Each student is examined seperately, and each fact recorded as observed. In all cases of doubt repeat the observation. The following is the blank:

Date of examination.
Name. (Written by the student.)
Age. (At nearest birthday.)
Nativity. (Give the name of the State or country where born.)
Nativity of father. (Give the name of the State or country where born.)
Nativity of mother. (Give the name of State or country where born.)
Complexion.
Hair, color of.
Eyes, color of.
Vaccinated, when successful.
Height, in inches.
Weight, in pounds.
Arm girth around largest part.
Forearm girth around largest part.
Waist girth, maximum at complete inspiration. Minimum at complete expiration.
Chest measure, maximum at complete inspiration. Minimum at complete expiration. (This measurement is, in males, taken under the vest; in females, over the dress.)
Chest capacity. (After as full inspiration as possible, as complete expiration in the spirometer; then read off the record in cubic inches.)
Arm lift, right. } (Not yet recorded; its value and the best method of test-
" left. } ing is under consideration.
Sight; left and right eye separately. (The student standing; the type hang-

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ing on wall, at height of eyes, opposite the light; type read at ten and twenty feet, and, in case of marked defect, at other distances.)

Color sight. (Tested by colored cards or skeins of woolen yarn of the primitive colors, and some of the shades. The student to match the card or wool offered, from the pile before him.)

Hearing. (For each ear, by watch at arm's length; one ear at a time.)

Eruptive diseases; small-pox, measles, scarlatina, chicken-pox, etc.

Remarks. (Note any other facts bearing upon health, especially predisposition and diseases.)

This form, if carefully filled, affords as complete a record of physical condition as is possible under the circumstances. The observer, if a physician, will while making it, get a fair basis for an estimate of the student's health, and the average of the record is the nearest approach to a "physical constant." The value of the average depending upon the number of accurate observations from which it is derived.

The following statistics explain themselves. My thanks are due to Prof. Hitchcock of Amherst college for the elaborate and interesting report of the department of physical instruction in that college. The example set at Amherst has stimulated other colleges to an intelligent imitation, and the benefits which are proven to have accrued there, are now to be secured in other colleges throughout the country, by similar methods. I have extracted such data as permit of comparison with those of the University of Minnesota.

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TABLE No. 1.

Physical data of Students, arranged by school and sex, for 1877, 1878, 1879 and 1880.

NAME OF INSTITUTION.	Age in years.		Height, in inches.		Weight, in pounds.		CHEST MEASURE. Maximum.		CHEST MEASURE. Minimum.		Mean girth of chest.		Chest expansion.		Chest capacity, in inches.		Nativity, American.		Nativity, other than American.		With one parent foreign.		Parents' nativity American.		Parents other than American.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F	M.	F.	M.	F.	M.	F.
University of Minnesota, 1877	20.79	20.60	69.36	64.56	144.55	120.34	36.19	32.54	32.91	29.41	34.55	30.97	3.28	3.13	.....	.....	81	24	4	..	...	...	66	22	20	2
University of Minnesota, 1878	20.72	21.53	67.87	64.99	140.94	124.57	34.62	32.92	30.78	29.10	32.70	31.01	3.84	3.82	243.18	168.82	149	91	13	2	5	8	109	73	46	12
University of Minnesota, 1879	19.70	19.40	68.50	64.60	148.00	124.90	34.20	32.20	30.20	28.30	32.22	31.00	4.01	3.90	243.40	162.30	28	13	3	1	...	...	20	12	10	1
University of Minnesota, 1880	19.54	19.55	68.74	62.50	139.50	115.52	34.70	32.37	30.50	28.78	32.90	30.62	4.14	3.60	249.65	142.70	26	10	3	..	2	2	19	10	8	1
Wasioja Methodist Seminary, 1880	23.63	22.32	68.42	63.90	150.20	125.16	38.90	33.70	35.30	32.53	37.10	33.11	3.50	1.80	294.80	199.00	31	19	...	...	2	1	29	17	.....	.....
St. Paul High School, 1879	16.94	16.99	65.69	63.38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	49	101	1	5	4	9	36	71	7	25
Goodhue Co. Teachers' Institute	.....	20.20	.....	64.53	.....	128.00	.....	33.79	.....	30.43	.....	32.11	.....	3.60	.....	147.70	...	34	..	3	...	6	...	17	....	1
RAMSEY COUNTY—																										
District No. 1, 1879	10.50	8.67	51.60	48.25	72.80	61.17	27.60	25.50	25.80	23.90	26.70	24.80	1.80	1.60	110.30	74.01	13	6	1	..	5	1	3	1	6	4
District No. 5, 1879	11.00	9.80	53.50	52.78	78.90	97.08	27.75	25.80	25.05	23.80	26.40	24.80	2.40	2.01	79.75	51.60	32	25	..	1	12	5	14	15	6	6
District No. 7, 1879	11.52	9.70	56.22	52.57	81.66	88.31	28.03	25.62	25.03	23.52	26.53	24.57	2.41	2.23	119.16	79.06	15	16	3	..	1	...	1	2	16	14
District No. 8, 1879	11.90	10.20	58.00	54.27	89.00	75.90	29.80	27.80	27.70	26.37	28.70	27.22	2.08	1.60	110.20	78.25	17	19	1	...	...	...	2	1	15	19
District No. 17, 1879	12.30	11.75	56.00	55.30	96.60	90.45	29.75	29.17	27.26	27.00	28.50	28.08	2.36	2.18	144.50	110.70	21	21	..	1	12	5	14	15	6	6
District No. 11, 1879	12.07	13.44	57.73	59.83	102.40	105.10	29.50	30.1	27.03	27.61	28.26	28.85	2.27	2.40	132.30	120.00	11	6	4	3	...	...	7	5	8	4
Average of District schools	11.55	10.59	56.51	56.83	87.22	87.09	29.07	27.80	26.31	25.37	27.96	26.40	2.22	2.16	116.03	116.72	109	93	9	5	30	11	41	39	57	53

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TABLE No. 2—University of Minnesota. Table of Nativities and Parents' Nativities, of students entering in 1879-'80, with per cent. of each class.

	No.	Total.	Per cent of totals.
Students born in Minnesota	42		50.
Students born in Wisconsin	5		5.98
Students born in Iowa	3		3.57
Students born in New York	6		7.14
Students born in Pennsylvania	1		1.19
Students born in Indiana	4		4.76
Students born in Connecticut	2		2.38
Students born in Ohio	2		2.38
Students born in Massachusetts	1		1.19
Students born in Illinois	2		2.38
Students born in New Hampshire	1		1.19
Students born in Virginia	1		1.19
Students born in Georgia	1		1.19
Students born in Maine	1		1.19
Students born in United States		72	85.73
Students born in British America	5	5	5.98
Students born in foreign countries	7	7	8.33
Students of American parentage	61		72.62
Students of foreign parentage	19		22.62
Students with one parent foreign	4		4.76
		84	

TABLE No. 3—University of Minnesota. Table of Physical data by Nativity and Parent Nativity with Maximum and Minimum Measurements for the male students entering in 1879-'80.

		Number.	Age.	Height.	Weight.	Mean girth of chest.	Chest ex pansion.	Chest en pacity.
Minnesota nativity and parentage American		24	18.79	69.07	142.84	32.89	3.92	256.04
Minnnesota nativity and parentage foreign		10	19.66	68.16	122.40	33.38	3.75	289.13
American nativity and parentage American		16	18.78	68.11	139.67	31.45	4.22	217.64
American nativity and parentage foreign		7	21.20	67.97	146.16	29.97	3.50	218.00
Foreign nativity and parentage foreign		5	19.33	66.66	131.00	32.84	4.33	247.77
Minnesota nativity parents American	Max		22	72.75	170	34.50	5.00	310.00
	Min		14	63.25	87	28.25	3.00	160.00
Minnesota nativity parents foreign	Max		22	76.00	185	35.75	5.00	310.00
	Min		16	63.25	151	31.33	3.00	210.00
American nativity—States other than Minnesota—Parents American.	Max		23	72.00	162	35.00	6.00	350.00
	Min		16	65.00	123	30.25	3.50	180.00
American nativity parents foreign	Max		23	71.75	158	34.50	4.00	230.00
	Min		15	64.50	105	24.25	3.00	200.00
Foreign nativity parents foreign	Max		25	73.00	170	36.00	4.50	300.00
	Min		13	62.00	114½	31.25	3.50	210.00

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TABLE No. 4—Showing average Maxima and Minima Measurement at the University for 1879–'80

	Number.	Age.	Height.	Weight.	Mean girth of chest.	Chest expansion.	Chest capacity.
University of Minnesota average for 1879–'80	60	19.62	68.62	143.7	32.40	4.07	246.52
Males.. Maxima	....	25.00	76.00	185.00	35.75	6.00	310.00
Males.. Minima	....	14.00	60.50	87.00	24.00	3.00	160.00
Amherst College average for 20 years	....	21.10	67.66	138.84	35.40	3.02	241.79
Males.. Maxima	....	35.00	76.00	216.00	43.00	5.50	426.00
Males.. Minima	....	15.00	58.00	84.00	27.25	1.50	116.00

TABLE No. 5—Mean Average of Maxima and Minima of the Females in University of Minnesota for 1879–'80.

	Number.	Age.	Height.	Weight.	Mean girth of chest.	Chest expansion.	Chest capacity.
Mean Average	24	19.47	63.50	120.21	30.31	3.70	152.50
Females. Maxima	....	26.00	70.00	175.00	34.00	5.50	240.00
Females. Minima	....	15.00	58.25	87.00	25½	3.00	100.00

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TABLE NO. 6—UNIVERSITY OF MINNESOTA.

(MALES ENTERING IN 1879-80.)

Students of Minnesota Nativity and American Parentage.

	Number.	Age.	Height.	Weight.	Mean Girth of Chest.	Chest Expansion.	Chest Capacity.
5 ft. 3 in. to 5 ft. 4 in.	2	17.50	63.40	132.50	31.75	3.75	115.
5 ft. 6 in. to 5 ft. 7 in.	3	19.33	66.25	130.66	32.50	4.33	270.
5 ft. 7 in. to 5 ft. 8 in.	1	20.00	67.	130.	30.25	3.50	220.
5 ft. 8 in. to 5 ft. 9 in.	4	19.25	68.25	145.12	30.50	4.12	257.50
5 ft. 9 in. to 5 ft. 10 in.	4	18.25	69.25	149.33	33.25	4.12	267.50
5 ft. 10 in. to 5 ft. 11 in.	4	18.33	70.25	156.25	35.79	4.	248.75
5 ft. 11 in. to 6 ft.	2	17.	71.25	151.50	30.40	3.50	285.
6 ft. 0 in. to 6 ft. 1 in.	2	19.	72.50	157.50	33.25	3.50	290.
6 ft. 1 in. to 6 ft. 2 in.	1	18.	73.	164.00	33.50	3.00	210.
6 ft. 2 in. to 6 ft. 3 in.	1	18.	74.	163.00	33.	4.00	300.

Students of Minnesota Nativity and Foreign Parentage.

5 ft. 3 in. to 5 ft. 4 in.	1	21.	63.50	162.	35.	4.	270.
5 ft. 5 in. to 5 ft. 6 in.	1	20.	65.	.....	31.50	3.	220.
5 ft. 8 in. to 5 ft. 9 in.	1	19.	68.	.....	33.00	4.	280.
5 ft. 9 in. to 5 ft. 10 in.	1	18.	69.	160.	31.33	3.	270.
5 ft. 10 in. to 5 ft. 11 in.	1	20.	70.	162.	34.50	4.	260.
5 ft. 11 in. to 6 ft.	1	19.	71.	151.	31.75	3.50	315.
6 ft. 0 in. to 6 ft. 1 in.	2	18.50	72.40	157.	34.25	4.50	255.
6 ft. 1 in. to 6 ft. 2 in.	1	18.	73.	164.	33.50	3.	310.
6 ft. 4 in. to 6 ft. 5 in.	1	22.	76.	185.	35.75	4.50	270.

Students of American Nativity and American Parentage.

5 ft. 6 in. to 5 ft. 7 in.	5	18.	66.05	134.52	31.30	3.90	211.
5 ft. 8 in. to 5 ft. 9 in.	1	21.	68.50	123.	30.25	4.50	250.
5 ft. 9 in. to 5 ft. 10 in.	3	20.33	69.33	141.66	32.66	4.	252.50
5 ft. 10 in. to 5 ft. 11 in.	2	18.50	70.	145.	32.90	4.25	275.
6 ft. 0 in. to 6 ft. 1 in.	2	19.50	72.	155.	32.00	4.	252.50

Students of American Nativity and Foreign Parentage.

5 ft. 4 in. to 5 ft. 5 in.	1	20.	64.50	126.50	33.	4.	230.
5 ft. 5 in. to 5 ft. 6 in.	1	23.	65.50	105.00	29.	4.	210.
5 ft. 6 in. to 5 ft. 7 in.	3	18.66	66.50	124.16	21.	4.	205.
5 ft. 7 in. to 5 ft. 8 in.	1	23.	67.	155.	34.25	3.50	200.
5 ft. 10 in. to 5 ft. 11 in.	1	21.	70.	158.	24.25	3.	220.
5 ft. 11 in. to 6 ft.	1	18.	71.75	147.	33.	4.	220.

Students of Foreign Nativity and Parentage.

5 ft. 2 in. to 5 ft. 3 in.	1	13.	62.	114.50	31.25	4.50	220.
5 ft. 7 in. to 5 ft. 8 in.	1	24.	67.25	152.	36.	4.	300.
5 ft. 11 in. to 6 ft.	2	23.	71.	138.75	29.75	4.	240.
6 ft. 1 in. to 6 ft. 2 in.	1	25.	73.	170.	33.	4.	270.

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THE HISTORY OF A MALIGNANT EPIDEMIC OF

PUERPERAL FEVER

IN A SETTLEMENT OF POLANDERS NEAR PERHAM, OTTER TAIL COUNTY, MINNESOTA.

BY V. SMITH, M. D.,

Member State Board of Health.

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NOTE.—The following papers make up the record of the fearful mortality of malignant puerperal fever in a farming community where nothing was done to stay its progress. They are instructive as showing the intimate association of superstition and disease, and on the other hand, how the simplest sanitary precautions do, in such cases, literally "stamp out" infectious diseases, when they are thoroughly taken, and enforced by the exercise of an average amount of common sense.

The instructions given by Dr. Smith were cordially followed by the clergymen, and the physician who was now for the first time called. The very next confinement in that settlement was with twins. Mother and children escaped all sickness, and up to the date of the last report not another case of puerperal fever has occurred.

C. N. H.

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PUERPERAL FEVER.

PERHAM, MINN., March 26, 1881.

To His Excellency, Governor John S, Pillsbnry, St. Paul:

SIR:—I take the liberty to inform you, that in the course of the last two years, amongst the Poland farmers in the near vicinity of Perham, fourteen women have died with a mysterious disease in childbed, probably epidemic puerperal fever.

All the women were healthy, sound and well framed, and gave birth to children without any extraordinary difficulty, but during confinement, or a short time after, the disease set in, and death has been the result in all cases. There are only thirty Poland families here, and of these fourteen woman died in childbed. Their German neighbors have not suffered such disease, but soon may, as they are daily exposed to contract the epidemic. Most of the women that died had no medical help or attendance whatever. The people, in their superstitious believings, take the disease as a plague, sent from the Lord God, and refuse medical help, even if such help has been offered gratis. Wherever a case has happened the people will send for the priest, but not for the physician. All of the deceased were natives of Poland, and members of the Roman Catholic Church.

I am of the belief that if your Excellency would confer about the matter with Bishop Seidenbush of this diocese, that he would take an interest in sanitary measures in the same wsy as Bishop Ireland of St. Paul does, and that his influence as well upon the clergyman as upon the ignorant people, would be of great benefit, and help to find means and ways to meet this plague. But if in any way possible a committee of skillful physicians should be appointed to investigate and find the sources of the disease.

Yours Respectfully,
HERMAN VON HADELN,
Justice of the Peace for Otter Tail Co., and Recorder of the Village of Perham.

STATE OF MINNESOTA, EXECUTIVE DEPARTMENT,
ST. PAUL, March 30, 1881.

Dr. Chas. N. Hewitt, Secretary of the State Board of Health, Red Wing, Minn:

DEAR SIR:—By direction of Gov. Pillsbury, who is confined at home by illness. I enclose a communication from Herman Von Hadeln, city recorder of Perham, Minn., in relation to a malignant disease prevalent in that vicinity, and the circumstances which obstruct the application of proper remedies.

The Governor requests that you will enquire into the matter and report as early as convenient. Perhaps if the superstition of the people prevents a resort to suitable remedies, a conference with Bishop Seidenbush, as suggested, may be had with advantage.

Yours Respectfully,
PENNOCK PUSEY,
Private Secretary.

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STATE BOARD OF HEALTH OF MINNESOTA,
SECRETARY'S OFFICE, Red Wing, Apr. 2, '81.

Dr. V. Smith, Member State Board of Health, Duluth:

DEAR DOCTOR:—Enclosed find papers which explain themselves:

1st. A letter from the Governor's Secretary. 2d. A letter to the Governor from Herman Von Hadeln, village recorder of Perham, on N. P. R. R.

Will you go to Perham and investigate this matter? Get at the history of the disease. See the priest and get his statement and look at some of the houses in which such terrible mortality has occurred. Make such other investigation as seems to you best. Return these papers with your report.

Yours Truly,

CHARLES N. HEWITT,

Secretary State Board of Health.

DR. SMITH'S REPORT.

DULUTH, Minn., May 30, 1881.

SIR:—In compliance with your request of April 2nd, to investigate a reported epidemic prevailing amongst the Polanders in the vicinity of Perham, Otter Tail county, in this State, I left here May 22nd and the next morning reached Perham, and immediately commenced an investigation. I first interviewed Mr. Herman von Hadeln. I then drove to the residence of the priest, the Rev. Joseph Beck. I presented the priest with a letter of introduction from Bishop Seidenbush, which Dr. Hand had kindly procured for me. I was kindly and cordially received by Father Beck, who showed a disposition to render me all the aid and furnish me all information in his possession. The priest directed me where to go and who to see; also advised his people to see me and communicate freely all facts relating to the disease. I found it very difficult to obtain reliable information from an ignorant class of people, such as those Polanders are, but I was compelled to rely on their statements almost entirely.

The investigation shows that fifteen deaths have occurred in the past two years, the last one about two weeks ago. All the deaths were confined to the wives of Polanders, and a short time after child-birth. A majority of the deaths were women confined with first child. It appears, also, that a majority of the deaths occurred the third day after birth of children, the exact number I could not learn: one or two cases died on the seventh day. I saw and questioned several women who had nursed several cases each, and put a great many questions to them, the following being the substance of their answers:

1st. Natural labor and not tedious.

2nd. Patients first two days after birth of child apparently getting along well, but about the end of the second day were suddenly taken violently ill with light chill, great thirst, head ache and delirium, and soon after a rash appeared all over the body and limbs, some describing the rash as being uniform and red, others as small red pimples, the latter I think correct; death ensuing a few hours after the appearance of the rash. Diarrhœa set in about the same time the

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rash appeared; no vomiting, secretion of milk said to be abundant, lochial discharge not suspended or changed in color or quantity.

The evening I left Perham a Polander and his wife called to see me, having been advised to do so by father Beck. The woman was pregnant and near the time she expected to be confined. I advised her to see a physician at once and place herself under his care; she promised to do so. Later I saw Dr. Richardson, who informed me that the woman had called on him and that he had engaged to attend her. The doctor promised to give the case close attention and report fully the result. The woman was present during her sister's sickness and death.

I advised Father Beck to instruct his people to bury the dead as soon as possible, not to have any public funeral, burn the clothing, thoroughly ventilate, cleanse and disinfect the premises. I think the priest will do all he can and advise all to call medical aid. None of the cases referred to above were seen by a physician.

Dr. Richardson saw one case, a report of which I am looking for daily, and as soon as received will forward you.

Father Beck informed me there were about sixty families of Polanders living in the vicinity of Perham, two settlements, one nearly west, the other north of Perham, and separate from each other from five to ten miles, but frequently visiting each other, deaths occurred in both settlements. I have learned this important fact that every woman falling a victim to this terrible disease had been present as nurse or had visited some one down with the disease. My opinion is the disease is a blood poison and contagious, attacking only women in child-bed.

Very respectfully,

V. SMITH.

CHAS. M. HEWITT. M. D.,
Secretary State Board of Health.

PERHAM, June 8th, 1881.

V. Smith, M. D., Duluth:

DEAR DOCTOR:—Yours of May 25th is received and in response to it I would say in regard to the prevailing epidemic amongst the Poland women that as far as I have traced up the matter, I found that some three years ago a Poland woman died here of consumption. This woman had come from Chicago; had there been confined, and after confinement was treated for puerperal fever. She had received good and careful treatment in the hospital for the puerperal fever, but took consumption afterwards and, as far as I can learn, she brought the contagion of the puerperal fever in her system over here. Then after she had died the puerperal fever made the first appearance amongst women that visited upon this person during her sickness and attended her when dead. Ever since that time the sickness has spread, but only among the Poland people, and hardly any woman has escaped death in child-bed since. The people are superstitious and do not believe in doctors or medicine. Some thought it was a plague that the Lord God sent upon them, and the greatest number of them believed that witchcraft had something to do with it. They had an idea that a certain Poland woman who had no children herself, had bewitched those that were raising chidren.

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I had but one case which I treated myself. When I was called, the sick person was in the state of puerperal mania; involuntary passages of water and blood took place. She had been confined fifteen days before and had been well for a few days after confinement. She was in such a state that medical help and treatment could not save her life.

The young lady you saw here on the day when you were here and whom you recommended to me, has been under my treatment. The person did well; the symptoms of rashes disappeared; she was confined, nine days ago, of twins (two boys) and is, up to this hour, as well as any person under such circumstances can be, and had no attack of puerperal fever at all, although she had all the symptoms of the disease that the women had that died, previous to her confinement, when I first saw her.

I have had no other case since I saw you.

Very Respectfully,
Yours truly,
J. S. RICHARDSON, M. D.

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STATE BOARD OF HEALTH

OF MINNESOTA.

TRACT NO. 3, 1881.

TYPHOID FEVER,

HOW TO PREVENT IT, OR IF IT OCCURS HOW TO STOP ITS SPREAD.

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NOTE.—All persons receiving this circular, printed for distribution through the State, will confer a great favor upon the Board if they will inform the Secretary, at Red Wing, of the existence of the disease in their locality.

A postal card giving the facts in brief will be promptly answered, and copies of this circular will be sent as required. This circular may be had of local health officers or of the Secretary of the Board.

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TYPHOID FEVER.

Typhoid fever is at the date of this report, threatening to again become epidemic in the State, and the probabilities are that the fall of 1881 will be accompanied by its unusual prevalence.

The State Board of Health therefore repeat the statements already made in various ways:

1st. That typhoid fever is peculiarly associated with filth in air and water, so much so that it is called the "filth fever." Therefore when it occurs, in a family, all premises should be thoroughly examined, especially cess pools, privies, manure heaps, cellars, and every other place where decaying vegetatable or animal matter is ever permitted to collect. *The chief danger is that the water supply has been infected by leachings from such collections, through the soil.*

2d. The disease is infectious by means of the discharges from its victims which gain entrance to the bodies of other people, chiefly through water, but also pobably by soiled clothing or bedding, and possibly by means of the poison floating in the air.

3d. The peculiar poison of the disease probably escapes from the bodies of the sick in the discharges from the bowels alone.

4th. That if these discharges are thoroughly disinfected immediately on their escape from the body, the probabilities are that the spread of the disease beyond the sufferer will be reduced to the minimum.

5th. That such disinfection can be surely and easily done by putting in the vessel to be used, a teacupful of a saturated solution of common green vitrol (sulphate of iron), which is cheap, easy of preparation and efficient.

6th. No better deodorizer can be found than that solution. Itself odorless, it is very destructive of odors, and at the same time as destructive of the poisons of disease. After such disinfection the discharges should be buried by themselves.

7th. That all clothing, bedding, etc., soiled by such discharges, should be *immediately* thrown into boiling water in which borax, or better boracic acid, has been dissolved in the proportion of half an ounce to the gallon. After thorough boiling they should be as thoroughly washed, wrung out, and hung in the air and sunlighit.

8th. *It is very important to remember that such discharges are the least dangerous immediately after their occurrence*, and that

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their thorough disinfection, and the disinfection and washing of articles soiled by them should be immediately done.

9th. To secure these advantages all persons sick with typhoid fever should be rigidly and entirely secluded till convalescent, and all discharges disinfected as above directed till the patient is entirely well.

The plan herein proposed is no new experiment, but a well established and successful method of dealing with typhoid fever.

It may therefore be stated as a truth that it is a disgrace to any well regulated community to suffer an epidemic of this fever—because it is in the power of the local board of health, if seconded by physicians and people, to prevent it.

The general rules are:

(*a.*) Seclude all sick and disinfect all discharges.

(*b.*) When the sick cannot be so treated at home, remove them to a secluded and comfortable temporary hospital, where they can have abundant fresh air, water, sunlight, and food, with freedom from all noise and trouble.

Perfect quiet is a very important aid to recovery.

In the hospital, patients do better if isolated in tents.

It is worthy of note that a large proportion of physicians, if themselves sick with typhoid fever, would prefer to be cared for in this way, because the chance of recovery is much greater than in the most luxurious house in a crowded town.

Every intelligent citizen should feel that he has himself to blame if a case of typhoid fever occurs in his family, because in the way pointed out he can usually prevent it. If heads of families will protect themselves by creating a public opinion sufficient to compel local boards of health to use their abundant legal powers to protect the communities for which they exist, typhoid fever can never become epidemic, and isolated cases will be guarded and cared for, as are the victims of small-pox. In this way typhoid fever has been "crushed out," and can be again.

Sustain and encourage your local health officer. The management of an epidemic of this, as of other infectious diseases, requires an active, intelligent and fearless local board of health. The physician who is health officer of such a board should be in fact, as in name, their *executive* officer, and should feel, as very few now do feel, that in the performance of his plain duty he will be heartily supported by his board and the people, whose representatives they are. He has a claim on the medical profession rather for advice and encouragement than for carping criticism, as he is, in fact, their representative in public sanitary work.

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STATE BOARD OF HEALTH

OF MINNESOTA.

TRACT NO. 2, 1881.

SMALL POX.

(VARIOLA.)

What is it? Where does it come from? Who are liable to it? How to avoid it. How to deal with a person or persons afflicted with it. How to prevent its occurrence.

A guide to heads of families, clergymen and others dealing with this disgusting and dangerous disease.

Copies of this tract may be had on application to the Secretary, Red Wing, Minn.

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SMALL POX.

What is it? It is a very infectious disease, characterized by a peculiar eruption in the surface of the body, which goes through the stages of pimple, little water blister, pustule and scab.

It has been mistaken for almost every eruptive disease, especially measles and chicken-pox. It is commonly called by the ignorant "black measles," "Dutch measles," and has often been mistake for chicken-pox.

Therefore, in all cases of doubt, insist upon the opinion of a physician.

Where does Small Pox come from? It is due to a peculiar poison, and, in Minnesota, is generally brought by immigrants, in persons or clothing from without the State.

It has also occurred in two localities, to the knowledge of the State Board of Health, by the use of infected clothing taken from the dead and packed away in trunks without disinfection.

Who are liable to it? Every person is born with a susceptibility to small pox, as to measles and scarlet fever, and probably other diseases. Persons of all ages seem equally liable to the disease. As a rule, one in three, unprotected by vaccination, having the disease, die.

A person once having had an attack, is not likely to have another.

How to avoid Small Pox. By vaccination and re-vaccination, and *by these alone.* It is to them that we owe our freedom from this epidemic form of the disease. Single cases and outbreaks in retired or isolated settlements indicate an increasing neglect of vaccination and re-vaccination. These outbreaks are the evidence of much inexcusable neglect. The fault lies as a rule with clergymen, teachers and leading citizens in such settlements to whom the people look, and are taught to look, for example and advice. The majority of outbreaks of small pox of late years in Minnesota have been in just such communities where a physician is rarely called for any case of eruptive disease, and where small pox

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has secured a firm lodgement before he has been consulted in the matter. The responsibility then rests chiefly with the clergyman, who, with the present light on the subject, should instruct his people as to this danger and himself be on the alert to detect its first occurrence, and insist upon medical advice in all doubtful cases. Of course when a physician is called, the responsibility rests upon him, and he should be held strictly accountable.

It is a matter of just congratulation that most of our population read and think and use common sense in this matter of small pox; accepting vaccination and re-vaccination: insisting upon strict seclusion of the sick; prompt disinfection of all infected clothing, bedding, etc., and quick and private burial of the dead. But as above stated all do not do it, and very many are too neglectful of the use of vaccine, upon which our safety depends. Let no one forget for a moment the fearful plague which the use of vaccine virus alone prevents.

"Before its use small pox was the most frightful and destructive disease which ever existed. It differed from all other plagues in its universal prevalence, at all seasons, and among all nations and all classes of men. Other pleagues are affected by season, place, race, etc., and prevail but a short while at a time. Small pox became thoroughly domesticated, and so a permanent and terrible cause of deformity and death. Vaccination and re-vaccination have changed all this, and, where they are properly used, have reduced small pox to a greatly diminished prevalence and fatality, but their regular and systematic use are our only safeguards. Small pox is the same fearful pest as ever. It is not changed at all. It is simply kept off those whom vaccination guards; hence the importance of an intelligent knowledge of what vaccination is and how to use it.

What is it? It is the virus of a peculiar disease of cattle called vaccinia or cow pox. Cow pox is small pox modified by passage thorugh the body of a healthy cow.

Vaccination is a method, by little scratches or punctures, of introducing this vacccine into the human body for the purpose of protecting it against small pox. It should be performed on young children on or before the third month. Remember that small pox may appear at any time: that it is very fatal to young children, and that up to puberty the protection of a successful vaccination is almost absolute. Therefore never fail to give them this protection at or before the third month. Do not wait for "teething" or "whooping cough" or anything else. *Vaccinate every little child.*

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How much does Vaccination protect? When thoroughly done, probably for life. But in an unknown proportion of cases, vaccinated persons exposed to small pox have a modified form of the disease called varioloid, which, though nothing like as dangerous to the sufferer, is as infectious to others as the original disease. Because of this uncertainty and consequent danger, it—vaccination—should be performed again immediately after puberty and, in the presence of small pox, upon all persons who have not been successfully vaccinated since puberty.

What kind of virus to use, and how. There are two kinds, animal or bovine, and humanized. The latter is the first passed through one or several human bodies. The State Board of Health advise the use of bovine virus gotten from healthy young heifers. It is now collected in several places in the United States by physicians. The Board procures it of Dr. E. L. Griffin, Fond du Lac, Wis. It comes on the point of lancet shaped pieces of ivory, ten in a bundle—price, $1 a bundle—for which money it will be sent pure and fresh by the doctor, with directions for use. It is better to order direct, as the virus loses it powers rapidly if long kept before use.

The value of vaccination depends quite as largely upon the care and skill of its performance as upon the virus itself. It is best, therefore, to have the family physician perform the little operation and watch the progress of the disease, as a perfect "mark" is evidence of protection. Each "point" (as they are called) of the animal virus holds sufficient for from three to five separate marks on the same person. They may be near together. If they can all be induced to "take" the security is greater and their number does not increase the severity or danger of the operation. Therefore always secure, if possible, three perfect marks or scars as evidence of vaccination. As to humanized virus, it is common and preferred in England. In our own country and state very many physicians use it. The most of the members of the State Board of Health prefer and use it in their own families. Therefore let no one hesitate to use a sample of it if approved by their family physician, in the absence of the animal virus.

When is Small Pox infectious? "Probably from the moment the "fever begins. It may be given by the breath of the patient before "the eruption has appeared on the surface of the body. It continues "infectious so long as any of the dry scales resulting from the erup-"tion remains. A single breathing of the air where it is is enoug

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"to give the disease. A dead body, for several days after death, has "been known to communicate the disease, and in all probability it "produce the disease for some months after. A mild case may and "often does give rise to a severe one, and a severe may cause a mild "one. The dry scab of small pox would most likely induce the dis- "ease long after if used as we use the vaccine scab." Clothes which have been worn by a person having the small pox may retain the poison for a long time, as does bedding, carpet, furniture, and even the walls and floors of rooms occupied by the sick with this disease. It has repeatedly spread, in all these ways, in Minnesota.

How to deal with one or more persons sick with Small Pox. 1st. Seclude the patient promptly and entirely from all association with other people—best done in a good wall tent away from dwellings and traveled roads; the nurse selected because he has had the disease or been recently successfully vaccinated, should be re-vaccinated as a matter of personal safety.

2nd. Disinfect all rooms, clothing, bedding, furniture, etc., used by the sick before removal, by the fumes of burning sulphur, under the direction of the physician, or in accordance with the rules for disinfection of the State Board of Health, (which may be gotten of the secretary at Red Wing.)

3rd. Immediately vaccinate or re-vaccinate all persons who have had anything to do with the patient, children or adults, and seclude the family till vaccination "works," or the period of incubation of small pox (14 days) has passed. In all cases, baths and change of clothing should be insisted on before such persons mingle with other people.

4th. Vaccination and re-vaccination should be urged on all people of the neighborhood. It is surprising how far the contagion from a single case can be spread by other persons before they themselves come down with the disease. From one case in Wadena a few years ago the disease was carried to Litchfield, the Yellowstone and to Winnipeg, by persons not sick when they left Wadena.

5th. Call a physician to all suspected cases immediately.

6th. Report all cases to the local health office, and by postal card to secretary State Board of Health, at Red Wing, who will forward copies of this circular and that on disinfection, and use every means in the power of the State Board to aid local authorities, individuals or families, in the battle with this disease.

7th. In case of death bury immediately, burn all clothing and

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bedding, and have the tent or shanty, if too valuable to burn also, disinfected under the local health officer's direction before it is re-occupied. If individuals and heads of families will adopt the means here advised, especially insisting on vaccination and re-vaccination, and enforcing precept by example, small pox cannot get a foothold in any locality of the State.

When it does occur in more than one or two cases before being promptly met, the blame will rest in those who, knowing the truth and the way, have neglected both, till a loss of human life makes such carelessness little, if at all' less than criminal.

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STATE BOARD OF HEALTH

OF MINNESOTA.

TRACT NO. 1, 1881.

INFECTIOUS DISEASES

WHAT ARE THEY? HOW ARE THEY SPREAD? HOW TO PREVENT THEM: BY CLEANLINESS, VENTILATION AND DISINFECTION.

Copies of this circular may be had of the Secretary at Red Wing, or of local Health Officers.

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INFECTIOUS DISEASES.

What are infectious diseases? Such as are caused by a peculiar poison, and are spread by the passage of that poison, from the bodies of the sick to the bodies of the well.

In order of mortality these diseases in Minnesota are about as follows: Typhoid fever, scarlet fever, diphtheria, puerperal fever, small pox, cerebro spinal meningitis.

How are they spread? In each disease of this class some portion of the body is particularly involved, and it is in this portion that the peculiar contagious virus is generated.

In small pox it is the matter and scabs from the skin

In scarlet fever it is the scabs from the lining membrane of the throat and mouth.

In measles, the same as scarlet fever.

In diphtheria, the mouth and air passages.

In typhoid fever and cholera, a certain portion of the bowels.

In every one some portion of the body is constantly throwing off an immense amount of little living particles containing the the virus of the disease. These particles find their way into water, air, and food, so we may eat, breathe or drink them; or they may get into the body by innoculation through the broken skin, as do glanders, from horses, or syphelis, from man.

Disinfection is a method of destroying these living particles before they reach new victims, and as soon as possible after they are formed. In some cases we can do this directly and certainly; as in *scarlet fever, measles and small pox.*

First—By anointing the body all over, twice daily, with an unguent made of cosmoline, or any other simple ointment, containing carbolic acid in the proportion of ten grains to the ounce. This is always grateful and helpful to the patient and should be kept up until the skin has gotten entirely well.

Second—By making sure that all clothing, bedding, etc., in contact with the patient, which can be washed, and is too valuable to be burned, is, on removal, immediately put into boiling zinc

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chloride solution hereafter described, boiled, wrung out and hung in the air and sunshine.

Third—All water used in washing such patients and all their discharges should be treated with the solution of green vitriol, hereafter described, before removal from the sick room, and should then be buried. In typhoid fever and cholera the discharges are to be treated in the same way. (See tract No. 3, 1881, to be had of the secretary or local health officer.)

In puerperal fever (child-bed fever) the peculiar discharges are the carriers of a virulent poison. They must be treated immediately as above directed, and a saturated solution of boracic acid should be constantly used on the cloths applied to the parts, as also to wash the hands of the nurse. All cloths so used to be immediately burned, on removal from the patient, and clothing, bedding and room treated as hereafter advised. Nurses must never forget that this poison may be, and very often is, carried on their hands or clothing to other child-bed women. In all cases of this disease, both patient and nurse should be treated as infected persons till the case, or the nurse's services, are ended. And the same precautions should be taken before visiting or attending other cases, as in small pox.

CARE OF ROOM, CLOTHING, BEDDING, ETC., AFTER RECOVERY OR DEATH OF ONE SICK OF INFECTIOUS DISEASES.

The room and all its contents, which have not been burned or washed, must be immediately prepared for fumigation as directed at the end of this tract.

On recovery, the patient should have frequent baths to the entire person, including the scalp, and wear clothes free of all infection before associating with other people.

After death, the body should be immediately wrapped in a sheet saturate with the zinc chloride solution, put into a tight coffin and privately and speedily buried. Transportation of the dead from infectious diseases is very rare in Minnesota, and never should be permitted, except in tight metallic coffins.

DISINFECTION—ITS METHODS AND THEIR USES.

It is the disinfection, not of the *smell*, but of the *life*, of disease

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virus. *Deodorizers* are not *disinfectants*, though many are advertised as such.

Disinfectants. First—Abundant and pure air, water and sunlight, with scrupulous cleanliness. These, if in constant use in and around a house, will do more to prevent or remove diseases of all sorts than all other measures together can do.

Second—if infectious disease is present, in addition to the above, use the following artificial disinfectants in the sick room.

a. Use the ungent (described on page 185) in all cases, under the guidance of a physician.

b. Remove all discharges in a vessel containing a saturated solution of green vitriol (sulphate iron); then bury them.

c. Put all clothing, towels, etc., which cannot be burned, immediately into a pail or tub containing zinc chloride solution, then boil and wash them.

d. See that no carpets or other superfluous things are left in the room to be occupied by the sick of infectious disease. Everything left there must be thoroughly fumigated and ventilated afterwards before other use.

How to disinfect rooms, furniture, carpets, etc., after use by a case of infectious disease. First—Fumigate with sulphurous acid, by burning sulphur. To do this, hang around the room on clothes lines all clothing and bedding which could not be washed, open up all hair mattresses (the contents of all others should be burned); take an iron dish, a spider or the like, fill with living coal and put the dish on bricks in a tub containing water about an inch in depth (this to prevent fire); on the coals put at least a pound of sulphur, go out of the room and shut the door. If coals are not available, or in place of them, pour a little alcohol on the sulphur dish and light that. The sulphurous acid gas is rapidly formed, and penetrates everything in the room. Leave the room closed for a day (24 hours). Then, if the fumigation has not been complete, repeat as before; when it is complete, open all windows and ventilate twenty-four hours more.

After recovery. All patients should be thoroughly washed (including scalp and beard) and have complete outfit of clean clothes.

After death. Immediately wrap the body in a sheet saturated with the zinc chloride solution, put in tight coffin and bury immediately and privately.

The disinfectants here advised are:

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Fisrt—Abundant and pure air, water and sunlight. These are abundant and ready for use out of doors. They are the most powerful preventatives of disease and destroyers of disease virus we have.

Second—By burning sulphur as directed in page 187.

Third—By the use of a saturated solution of green vitriol in water as herein directed.

Fourth—By the use of zinc chloride solution. It may be cheaply made in the following proportions: White vitriol (zinc sulphate), 4 ounces; common salt, 2 ounces; water, 1 gallon.

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INDEX.

Ages of the Dead.
for ten years in Minnesota 118
from Diphtheria in Minnesota 121
year 1879 94
Analyses.
of suspected waters 134
of water for other than sanitary purposes declined 131
of water an aid to etiology of disease 131
of water a means of sanitary education 131

Berry, Dr. Charles, on diphtheria 106
" " " 44
Boardman, Dr. C. H., on cottage hospitals for insane 48
Blue Earth County, diphtheria in, in 1879 68
Boards of Health Local, should be permanent and independent 52
Breed, Rev. R. D., on practical hygiene 41
Brown County, diphtheria in. in 1879 69

Cerebro Spinal Meningitis, notes on 111
Children.
very susceptible to insanitary surroundings 122
deaths of from local diseases 123
should be the especial care of local boards of health 125
general causes of mortality among 124
specific " " " 125
diseases causing greatest mortality among 119
causes of disease among, compared 120
causes of disease preventible, among 120
Chisago County, diphtheria in, in 1879 71
Cholera Infantum.
most fatal disease among children 121
its causes 122
its prevention 122
Christian Association Young Men's, sanitary work of 61

Digitized by Google

Clergy.
duty of in practical hygiene 42
relations of to public health 39
Conley, Dr. A. T., report on diphtheria in Cannon Falls 56
Correspondence, of com. on diphtheria 104
Country Removal to, of sick children 122
Co-operation Inter-State, in dealing with infectious diseases ... x
Crime, hygiene of 46

Dakota County, diphtheria in, in 1879 71
Dana, Rev. Dr., on practical hygiene 41
Davis, Hon. C. K., on hygiene of crime 46
Davis, Dr. E. J., on management of diphtheria 61
Deaf, Dumb and Blind, hygiene of 47
Deaths.
from specified causes compared 94
from zymotie disease for 7 years 95
Dead.
parent nativity of in Minnesota 118
ages of and per cent. of each age to towns 118
under 5 years of age in towns and county 119
Debility and Inanition as causes of death among children 51
Difficulties, of health officers of cities 123
Diphtheria.
table showing deaths from, by counties, months and birth-place 93
evidence that it is infectious 54–60–94
how to control 53
influence of impure air on 55
record of a successful fight against 56
poison of conveyed by clothing after months 58
report of Dr. Staples on 67
practical measures for prevention of 98
special preventive measures against 103
tract of state board of health on 100
observations on by committee 95
Diseases causing greatest mortality among children 119
Disinfectant, how to prepare and use 102
Dodge County, diphtheria in, in 1879 71
Douglas County, " " " 72
Educated People.
how they ought to aid practical hygiene 38
their duty to boards of health 42
Evans, Dr., abstract of paper by 51

Digitized by Google

Filmore County, diphtheria in 72
Filters, a simple form of 132
Folwell, Pres., on hygiene at University 62
Freeborn County, diphtheria in 73
Goodhue County, diphtheria in 74

Hadelen, H. Von, asks for aid against infectious disease 167
Hagan, Dr., necessity for practical hygiene in St. Paul 44
Hand, Dr. D. W., notes on cerebro spinal meningitis 110
Hewitt, Dr. C. N.
paper on voluntary sanitary association 42
report on sanitary water survey of Minnesota 129
report on health of children in public schools 157
letter on diphtheria 98
Health Officers.
should be physicians 51
difficulties of city 51
Health, Local Boards of.
have ample power 52
difficulties of 52
should be more permanent and independent 52
Hennepin County, diphtheria in 76
Home the Hygiene of, the unit of public health 59
Home, hygiene of abstract of paper on 59
Hospitals, cottage for insane 48
" " " descrition of 50
Hunt, Dr. M. V., on long life of diphtheria virus in clothing .. 58
Hygiene Municipal, discussion on 46
Hygiene of.
crime 46
deaf, dumb and blind in school 46
reform school 48

Infancy, vital statistics study of 117
Inter-State Co-operation, as to infectious diseases x
Ireland, Rt. Rev. John, essay by 39

Kandiyohi County, diphtheria in 78

Leonard, Dr. W. H., on meteorology of Minnesota 145
Le Sueur County, diphtheria in 79

McLeod County, diphtheria in 80
Meeker County, diphtheria in 81
Meteorology of Minnesota 145

Digitized by Google

Minnesota.
water survey of 129
meteorology of 145

Minneapolis.
duties of health officer assigned to city physician 60
diphtheria in 1879–80 76
well water supply of 134
river water supply of 138

Nicollet County, diphtheria in 82
Nobles County, diphtheria in 82
Noyes, D. B., on Young Men's Association, sanitary work of . 61

Officers of Health.
of cities, difficulties of 51
of rural difficulties of 44
should not be city physician 60

Olmsted County, diphtheria in 83

Pioneer Press, report of proceedings of sanitary council in St. Paul 37
Popular Sanitary Councils, paper on 35–63
Programme, sanitary council at St. Paul 36
Pillsbury, Governor, remarks at sanitary council, St. Paul 36

Physicians.
their difficulties in sanitary work 44
desirous of consultation as to prevention of disease xi
the real workers for public health xi
Parents, how they may help in sanitary work ix
Pupils, health of in public schools 157
Puerperal Fever, history of an endemic of 167
Perham, puerperal fever near 167
Rhieldaffer, Rev. J. H., on hygiene of reform school - - 48
Reform School, hygiene of - - - - 48
Ramsey County, diphtheria in - - - - 83
Redwood County, diphtheria in - - - - 84
Renville County, diphtheria in - - - - 84
Rice County, diphtheria in - - - - 85
Rock County, diphtheria in - - - - 85

Digitized by Google

Report on Diphtheria.
of committee of board - - - - 67
special report on, in Brown and Nicollet counties - 106
in Cannon Falls, special - - - - 56
in different counties (see under each county name) - 68–108
Report on
cerebro spinal meningitis - - - - 110
vital statistics of infancy and childhood - - 117
sanitary water survey of the state - - - 129
meteorology of Minnesota - - - - 145
public schools, children in - - - 157
Sanitary Associations.
voluntary organization of - - - 42
necessity for in Minnesota - - - - 45
resolution respecting of sanitary council in St. Paul - 44
Staples, Dr. F.
diphtheria in its relation to public health - - 52
paper on diphtheria read before sanitary council St. Paul 52
evidence of contagiousness of diphtheria - - 54
rules to prevent diphtheria - - - 54
Sample, Rev. R. H., abstract of paper on hygiene of home by 59
Sherburne County, diphtheria in - - - - 85
Sibley County, diphtheria in - - - - 86
Stearns County, diphtheria in - - - - 86
Steele County, diphtheria in - - - - 87
St. Louis County, diphtheria in - - - - 87
Statistics.
vital of infancy a study of - - - - 117
small-pox liability of its occurrence in 1880 - x
Schools Public, health of pupils in - - - 157
Smith, Dr. V., report of endemic of puerperal fever - 168
Thomas, Rev. Dr., his views of practical hygiene - - 41
Vaccination, the only preventative of small-pox - - 7
Vital Statistics of Infancy, report on - - - 117
Voluntary Sanitary Associations, organization of - - 42
Wabasha County, diphtheria in - - - - 80
Waseca County, diphtheria in - - - - 89
Watonwan County, diphtheria in - - - - 90
Winona County, diphtheria in - - - - 90
Wright County, diphtheria in - - - - 91

Digitized by Google

Water.
survey of Minnesota report on - - - 129
method of collecting for analysis - - - 129
analysis, form of report on - - - - 130
analysis, method in use in laboratory - - 129
impure, relations to disease cause - - - 131
Women associated, labor by for hygiene - - xi

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From Prof. M. N. Harris

614.0979
M16

BIENNIAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MINNESOTA,

FOR THE YEARS 1881 AND 1882.

PRINTED BY AUTHORITY.

MINNEAPOLIS:
JOHNSON, SMITH & HARRISON.
1884.

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NINTH REPORT

OF THE

STATE BOARD OF HEALTH

OF

MINNESOTA,

FOR THE YEARS 1881 AND 1882.

MINNEAPOLIS:
JOHNSON, SMITH & HARRISON,
1883.

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TABLE OF CONTENTS.

1 LETTER OF TRANSMISSION TO THE GOVERNOR.

2 GENERAL REPORT OF THE BOARD.

3 FINANCIAL STATEMENT FOR 1881,-'82.

4 SMALL POX IN 1881-'82. SPECIAL REPORTS AND CORRESPONDENCE.

5 REPORT ON THE METEOROLOGY OF THE STATE.

6 SANITARY WATER SURVEY OF THE STATE.

7 TYPHOID FEVER, REPORTS ON—

8 DIPHTHERIA, REPORTS ON—

9 TRICHINOSIS REPORT ON—

10 VACCINATION. WHAT IT IS AND WHAT IT HAS ACCOMPLISHED IN MINNESOTA IN 1861-'82.

11 SANITARY COUNCILS OF 1881-'82.

12 GENERAL REPORTS OF HEALTH OFFICERS.

13 CATALOGUE OF THE LIBRARY.

14 CATALOGUE OF CHEMICAL AND PHYSICAL APPLIANCES IN THE LABORATORY OF THE BOARD.

15 SECRETARY'S REPORT.

16 INDEX.

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STATE BOARD OF HEALTH OF MINNESOTA,
OFFICE OF THE SECRETARY,
RED WING, MINN., JULY 17, 1883.

To His Excellency, L. F. Hubbard, Governor of Minnesota:

SIR:—I have the honor herewith to transmit the Ninth Report of the State Board of Health, for the years 1881,-'82.

It is proper to state that the manuscript was ready for the printer in November, 1882, but has been crowded out by other State printing until this time. In view of this delay I have revised the General Report up to January 1st, 1883.

Very respectfully,

Your obedient servant,

CHARLES N. HEWITT, M. D.,

Secretary and Executive Officer.

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MEMBERS

OF THE

STATE BOARD OF HEALTH.

NAMES AND RESIDENCES.

President,

D. W. HAND, M. D. ..... St. Paul.

Secretary,

CHARLES N. HEWITT, M. D. ..... Red Wing.
V. SMITH, M. D. ..... Duluth.
FRANKLIN STAPLES, M. D. ..... Winona.
E. J. DAVIS, M. D. ..... Mankota.
CH. GRONVOLD, M. D. ..... Norway.
W. H. LEONARD, M. D. ..... Minneapolis.

All official correspondence should be addressed to the Secretary, the executive officer of the Board.

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REPORT.

The State Board of Health respectfully submit the following General Report for 1881–82.

SMALL POX. During these years the statistics of this disease in the State are as follows:

Year.	No. of outbreaks.	Families invaded.	Cases of Variola and Varioloid	Deaths.
1881.....	11	19	76	16
1881	1*	.....	166	28
Totals.....	12	.....	242	44
1882.....	32	72	257	52
Grand Total.	44	.. ..	499	96

*Stearns County reported separately because number of families invaded is not reported.

Average mortality 19.23 per cent.

Twenty-six counties were invaded.

Of thirty outbreaks there were confined to							one family.....	16
"	"	"	"	"	"	"	two families.....	6
"	"	"	"	"	"	"	three "	2
"	"	"	"	"	"	"	five "	1
"	"	"	"	"	"	"	six "	1
"	"	"	"	"	"	"	seven "	1
"	"	"	"	"	"	"	ten "	1
"	"	"	"	"	"	"	thirteen "	1
"	"	"	"	"	"	"	sixteen "	1

Of the epidemic in Stearns county, in 1881, we have no record of the number of families affected except for certain towns. Two of the outbreaks of 1881 were continued into 1882. These were in Stearns and Houston counties, and there is reason to believe were caused by the carelessness of local authorities in the matter of disinfection of houses, and the destruction and disenfection of bedding and clothing. From Dr. Schmidt's report, appendix, page——, this seems evident as to Stearns county, and it is more than probable in

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Houston county. The obstinate refusal of the local boards of country districts to destroy bedding and their frequent willingness to burn houses, is one of the inexplicable problems for health officers. The State board have no power in this matter, though on the appeal of health officers, the secretary has repeatedly advised local boards to destroy infected bedding. It is hardly possible, with facilities at their disposal, to effectually disinfect such articles, especially the feather beds, which have been a constant source of anxiety to the health officers.

By a reference to the Secretary's report appendix p.— it will be seen that in July 1881, this Board, by circulars, correspondence and through the newspapers, called popular attention to the increasing danger of the importation of small pox from other States, Canada and from abroad, by immigration, and the further danger of its appearance in districts having no physicians. While that appeal for vaccination and re-vaccination, and for prompt notice to this Board of any outbreak, was being prepared, the disease, in the very way feared, was beginning the worst epidemic we ever had, in Stearns county. It was not till October that the nearest physicians had any knowledge of its existence in the town of Spring Hill. The various reports in the appendix give the details, and the Secretary summarizes them in his report, p—.

No other outbreak assumed anything like the proportions of this one (222 cases and 34 deaths for 1881–1882). The first case in July, 1881, and the last in March, 1882. In their order the other outbreaks were:—

(2) 43 cases—13 deaths.
(3) 38 " — 9 "
(4) 28 " — 5 "
(5) 25 " — 7 "
(6) 13 " — 2 "
(7) 10 " — 3 "
(8) 8 " — 2 "
(8) (9) (10) (11) 7 cases—2 with 2 deaths, 2 with 1 death.
(12) 5 cases—0 deaths.
(13) 4 " —1 death.

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(14) (15) (16) (17) (18) 3 cases—in one all died; in another 1; in 3 none died.

(19) (20) (21) (22) (23) 2 cases—in two 1 died, in 3 none died.

In every outbreak where over 10 cases occurred, a reference to the data herewith printed, and the records of the secretary's office show very clearly that it might have been controlled if taken in time. The single exception is Minneapolis, where, as a place of distribution for immigrants, it was very difficult to track out cases often times deliberately kept from the Health Officer's knowledge. The importation of the disease into the city from the Pest House by the party hired to transport cases there on the forged order of the Crystal Lake Board of Health should have been thoroughly investigated and punished by the city authorities to whom the Health Officer referred it.

The various reports in the appendix as to small pox each in its way, give the facts of the constant popular neglect of the simplest precautions against that disease, and of the opposition to quarantine and vaccination, not only by the ignorant, but by people whom we have the right to believe should be aware of the demonstrated value, and therefore absolute necessity of those measures as against this disease.

We call attention to the defects of the existing laws. The organization and relative powers of local Boards of Health, differ according to the wording of their charters in the incorporated villages and cities. The Township Board of Supervisors are, *when necessary*, a Board of Health. In most cases no provision is made in the law for a physician as the *executive* officer of such boards. Their *personnel* is changed every year.

Our experience has been, that in an emergency, when they should be active and efficient, ready and prompt, no one is better aware than they of their entire unfitness for their work, and unless they happen to have a competent physician whose direction they may follow, they rarely do anything. As the existence and work of the State Board of Health has become known, it is more and more appealed to for help and advice and to nominate Health Officers, and the Secretary is, as a rule, asked personally to

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superintend the control of epidemics. He has found the township Boards as a rule willing to act except where much pecuniary outlay was involved, and then it was, not unfrequently, with the greatest difficulty that the necessary work was done.

Health officers, whom he has employed at the request of such Boards, have gone months without their pay, and had the greatest difficulty in getting it even then. This is not always the case, but it is so frequent that there is increasing difficulty in securing medical men competent for this duty. One of the most efficient health officers of Stearns county, in the epidemic of 1881–'82, Dr. Schmidt, of Richmond, has as yet effected no settlement of his accounts or received pay for his services; and in Scott county, where the personal devotion of the health officer, Dr. Jas. H. Dunn, of Shakopee, saved the county an inestimable loss of life and money, he at great pecuniary sacrifice, went for months not only without his pay, but without money advanced by him to pay for necessaries for the sick. Fortunately the assistance and co-operation which this Board has been able to give has been welcomed not only by health officers but by the local boards themselves so long as the danger lasted, and by our advice we have been able to assist in securing a good deal of efficient local work in dealing, particularly, with small pox, but also with other epidemic and infectious diseases.

While fully aware of the defects of our existing sanitary laws we have, for the above reasons, waited till the necessity for a change should be apparent to all before asking the action of the Legislature.

The Secretary has compiled a bill enacting the most important changes which experience suggests. After submisssion to the Attorney General it will be carefully considered by this board and presented to the coming Legislature. It covers the management of infectious and epidemic diseases and correlates the functions of the local boards of health with each other and the State Board, in such a way as to secure the most prompt and efficient action. There are other difficulties in the prevention or control of such diseases which as of constant occurrence deserve mention.

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1st. The absence of any funds in town treasuries available for this purpose.

2d. The lack of hospital, vacant houses or other means of caring for the first victims outside their own homes, and consequently the inevitable risk that others in the family must take the contagion from the sick. This danger a certanty, when, as has repeatedly happened, vaccination was refused in case of small pox.

3d. The neglect, or difficulty of quarantine of persons exposed to first cases, and carelessness in disinfection.

4th. As to small pox—the wide-spread opposition to vaccination, especially among the German population, who have suffered most from this disease.

5th. The difficulty of procuring competent nurses for the sick of infectious disease.

The first difficulty is one for which some legislative provision should be made.

As to the second, we have repeatedly proposed hospitals, tents, and in a few cases vacant houses have been used, or temporary barracks have been built.

The third and fourth difficulties are being gradually overcome, but their removal would be easier if the clergy especially would, by example and precept, help to overcome the prejudice which has so little foundation in fact. The brief resume of the evidence of the safety, and absolute necessity of vaccination, which our secretary presents, Appendix p. will be published as a tract for wide-spread distribution. That tract and the reports herewith published furnish much more evidence of the value of vaccine, than Jenner used in the beginning of this century, to carry conviction to the whole civilized world. We appeal with an earnestness born of a terrible experience of its necessity, during the last ten years, for the hearty and constant co-operation of all educated people, in the effort to make vaccination the rule in infancy, in the schools, and by everyone in the presence or in danger of small pox. We can not conclude this part of our report without a hearty tribute of of praise to the physicians, who at great personal sacrifice have served as health officers during the years 1881-82. Under circum-

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stances of peculiar discouragement and difficulty they have performed their duty as their reports herewith presented show. For the first time in the sanitary history of Minnesota physicians serving as health officers have been set apart by a special and prolonged service from their fellow practitioners. They have demonstrated *by doing it*, the character and value of the health officers' work. In this practical and natural way we are educating an increasing number of physicians in public hygiene. Distributed all over the state, they are our reliance in presence of epidemics, ready, alert and capable.

As will be seen by reference to their reports, the health officers have frequently lacked cordial and hearty support by the boards of health whom they have served. By individual members of such boards, and other energetic citizens, they have sometimes been given very welcome assistance. We note with pleasure the work done by County Commissioner Jacques of Sauk Centre, and County Commissioner Pirz, of Richmond, Stearns county, and call attention to the statement of the reports of Health Officers DuBois and Schmidt, with respect to them. The most extensive outbreaks of small-pox during these years as heretofore, have been among the German population of country districts. In some instances great assistance was rendered to our Secretary and the health officers by the clergy of these districts, of which mention is made in the reports.

January 1st, 1883. At this date, when this report ends, small pox has appeared in a lumber camp on the upper Mississippi, the extent of which is not yet fully ascertained because of the transient character of the population there. This board have the matter in charge. Another limited outbreak exists in Isanti county, fully under control. Sporadic cases are likely to occur in Minneapolis, but the health officer is using every effort to prevent them. The chief difficulty here is in the communication between certain classes of city population and the lumber camps, as also the constant liability to importation from the places outside the state. St. Paul has been so fortunate as to escape with a very few sporadic cases.

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VACCINATION.

The Stearns county epidemic chiefly, and the other outbreaks in proportion to their number and severity, have powerfully stimulated the use of vaccination among the entire population. We have failed as yet to secure any accurate registration of vaccination, and for the following reasons:

1st. The absence of legislation, state or local, on the subject.

2d. The lack of active local health boards outside the large cities.

3d. The fact that the operation as a rule is only sought for under the alarm of the approach or existence of small-pox, when physicians have little leisure, or inclination, for detailed records or statistical work.

4th. A considerable proportion of vaccinations are done by parents or other non-professional persons. In the absence of physicians, or when the work has been too great for them to do as rapidly as possible, health officers have been compelled to accept such aid as they could procure.

This haste and lack of careful medical service in the selection and use of vaccine, and oversight of results have, with the usual accidents of the rupture or other injury of the vesicle, and careless exposure during its development resulted in septic wounds, excessive sloughing, etc., in many cases, bringing vaccine into undeserved discredit. See report on vaccination, appendix p. —

HOSPITALS FOR INFECTIOUS DISEASES.

Their necessity is demonstrated and admitted in the *presence* of small pox, and then when any provision is made it is so temporary in its character as not to be worth preserving after use. Occasionally a vacant house is available, but not adapted to the purpose. The Secretary is preparing a paper on the subject, which will include plans and specifications for such hospitals, tents, barracks, and more permanent structures with estimates of expense of construction, and also propable expense of necessary provision for the care of the sick.

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NURSES FOR THE SICK OF INFECTIOUS DISEASE.

It has been almost impossible to secure competent nurses of this kind.

1st. Because of the popular belief that they must have had the disease for which they care, e. g., small pox—and a distrust of the preventive power of vaccination, or other sanitary precautions.

2d. A natural indisposition to take such work by competent professional nurses, who have enough to do in less disagreeable ways.

3d. That the work is, therefore, usually undertaken by people unfitted by education and habits for its proper execution.

Other difficulties will readily occur to any familiar with such work.

As to a remedy nothing occurs to us more practicable than that on the staff of nurses of our city hospitals such as are fitted for this duty should be encouraged to undertake it; and that by an increase of wages and by proper special training such work should be made not only respectable, but desirable. Such provision for nurses for small pox and other infectious diseases should be a part of the work of schools for nurses, for which there is already a demand in Minnesota, and for the organization of which this board will co-operate.

OTHER EPIDEMIC AND INFECTIOUS DISEASES.

Diphtheria.—This fatal disease caused a large mortality in 1881. 1397 deaths, 12.12 per cent. of total mortality. The per cent. of mortality has increased constantly since 1872. In every practicable way as our reports show, we have urged upon local authorities the infectious character of Diphtheria, and its large and increasing mortality, despite the best medical treatment. Our tract on diphtheria has been distributed all over the state, and the medical profession have largely co-operated with us, and yet at the date of this report, it is rarely the case that the disease is dealt with as so fatal a disease ought to be. In the new legislation to be asked for, the same rules are urged as respects quarantine of sick, of infected houses, for disinfection of persons' clothing, etc. and for private funerals of the dead, as in small pox. Let it be clearly understood that it is not the fault of health officers or of an increasing propor-

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tion of physicians, that these simple and practical rules are not, as they ought to be, the daily practice, not only for towns, but for every family in the state. Till they are so, or until the food for this disease in our children has been consumed in death, or recovery from its attack, this fatal disease will figure largely in the mortality statistics of our population. This board will remit no effort for so necessary a reform, and they in common with other physicians, invoke the aid of the clergy, of the newspapers and of heads of families in the work.

See reports in appendix.

Typhoid Fever.—There has been more than the usual mortality from this disease during the past two years. Minneapolis has suffered most.

In September, 1881, our Secretary by the direction of this board, met the City Physician, Dr. J. H. Salisbury and Mayor Rand. It was feared that a wide-spread distribution of the disease might occur from the presence of large numbers of people from all over the state at the great fair to be held in the city. The disease was then chiefly confined to tenement houses, boarding houses, etc., likely to be largely patronized at that time. It was agreed that the physicians of the city should be called on to report typhoid fever cases promptly, that a tent hospital should be provided on land belonging to the city, outside the limits, that the typhoid sick should be removed there, as soon as possible, that infected houses should be closed to be disinfected, cesspools cleaned, and that no such infected boarding house, hotel or eating house should be open during the fair. Dr. W. H. Leonard of this board organized a temporary hospital in the fair grounds for any who might be taken sick or injured there. The unfavorable weather during the fair week prevented the expected large attendance from outside, and no extension of the disease beyond the city except in a few isolated cases was reported.

The inevitable question of expense speedily came to the front as to the temporary hospital for the city typhoid fever cases; and soon the city physician was compelled to give it up The disease

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gradually spread from the poorer to the better parts of the city. His report gives the condition of affairs till Dr. Cockburn was appointed health officer. His report then reaches up to January 1st 1883. Legislation to enable health officers to use recognized sanitary measures for the control of this disease will be asked for; also to require prompt notice of all epidemic and infectious diseases by physicians to the health officer.

The water analysis made of samples taken by Dr. Salisbury from suspected wells demonstrates the defilement of their supply by soakage from collections of decaying vegetable and animal matter, often probably direct from cesspools and privy vaults.

The rapid growth of Minneapolis, and the peculiar nature of the soil natural and artificial built upon, has made the task of providing sufficient water supply and sewerage very expensive and difficult. Both are being rapidly improved. It is safe to believe that in the districts first invaded by typhoid fever the well water supply was unfit for drinking purposes, and probably served as a vehicle for the transmission of the specific poison. It at least helped to furnish the conditions under which the disease is most likely to occur.

TRICHINOSIS.

The only appearance of this disease during the years 1881–82 and the only recorded outbreak with post mortem examination of a victim, occurred in Minneota in January 1882. The report of the health officer is appended. All specimens of infected flesh, human or of the pig, were examined in our laboratory; and a considerable number of other suspected specimens of pork were received from different parts of the state. In none outside the infected locality, except New Ulm, where one of the Minneota victims came under the care of Dr. B. Carli, (See appended report.) was the disease discovered. Though every effort was made to discover the source of the infection for the hogs (the body of a rat from the infected pen was found free from the worm) it was not discovered.

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THE LABORATORY OF THE BOARD.

Work here has been confined almost exclusively to the examination of suspected water supply, and the regular work of watching the supplies distributed by water works in different cities of the state. Though it is known that samples of suspected adulterations of food would be received, nothing worth record here has been submitted. In water analysis the Wanklyn process has been as heretofore the one used; but all the other recognized methods except Frankland's have been resorted to when necessary to verify important results. See report p—

LIBRARY.

The reference library of the board consists of:

1st. Reports of state and local boards of health, and of the general government, National Board of Health, Marine Hospital Service, Navy, Army, etc.

3. Sanitary journals, weekly and monthly, American, English and French, with complete files of the most valuable.

3. Reports of the medical office of the privy council, of Great Britain, a complete file up to date.

4. Public hygiene, the leading authors, American, English and French.

5. Personal hygiene, the leading authors, American, English and French.

6. Water supply, engineering and analysis, American and English.

7. Foods and Drinks, the leading treatises, American, English and French.

8. Ventilation and warming, the leading treatises on, American, English and French.

9. Drainage and Sewage disposal, American, English and French.

10. Diseases and Sanitary Police of Animals. American, English and French.

1. Popular hygiene, books, pamphlets, tracts, leaflets etc.

11. Subjects collateral to hygiene, microscopy, entomology, and other branches of natural science.

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This library has grown gradually, chiefly to supply the demands of the Secretary's office, to whom an increasing number of inquiries, involving the literature of hygiene, are constantly coming. It will interest physicians to know that it contains a copy of the original edition of Jenner's Variolæ Vaccinæ, with colored plates, and an increasing series of monographs, and treatises upon *inoculation* and *vaccination* in all their relations. The library has now grown to be of value for reference by health officers, physicians, and others studying any department of hygiene. It is increasing constantly from necessity, but only as required for work incidental to the duties of this board, its secretary and health officers. It will soon be in such order that it may be consulted daily, except Sundays, at the secretary's office, from 11 a. m. till 4 p. m., and some of the books will be loaned to Health officers for a limited time on application to him.

SANITARY COUNCILS.

Three have been held—Aug. 31st, and Sept. 1, 1881, in Albert Lea. Oct. 17th and 18th, 1881, in Mankato, and Dec. 6th and 7th, 1882, at Minneapolis. The one held in Feby., 1881, at St. Paul, was detailed in our last report. The others will be found reported in appendix. We have found these councils, at small expense of money, gathering places for men and women who are practical workers in hygiene. The last one, in Minneapolis, brought together a representative number of our best health officers, who did more than any one else could have done to influence popular opinion to a better support of sanitary work. They did more than that. The editorial of the Pioneer Press on the first days proceedings quoted in the general report of the council, is impartial evidence of the value and importance a portion of the work then done, and also a fitting recognition of the services which health officers are constantly and quietly performing in increasing numbers in our state. It should be noted too that the clergy, the legal profession, the engineer, the Department of Public Instruction, and the University were represented by papers read at this

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conference. The entire report is worthy of careful study. As occasion seems to offer, or necessity demand, we shall continue these conferences—relying upon the hearty support, which has not yet failed us when asked, for service of this kind.

POPULAR EDUCATION IN HYGIENE.

We have availed ourselves of every opportunity to further popular enlightenment, beside these conferences, by lectures, newspaper articles, and by the circulation freely throughout the State of our tracts on various subjects. Our secretary as Professor of Public Health lectures at the University to the undergraduates, and will participate in the lectures of the farmers' course at the Agricultural College early in 1883.

HYGIENE IN THE SCHOOLS.

We have spared no effort to secure better knowledge of elementary hygiene in our schools and among their teaching force. The secretary has repeatedly addressed the State Teachers' Institutes and urged upon successive State Superintendents of Education since 1872, the necessity for better work in this direction. He will prepare the questions upon hygiene to be answered by applicants for all grades of certificates as teachers in the public schools of the state for use in 1883. This at the request of Superintendent D. L. Kiehle.

As for the scholars, the elements of personal hygiene are easily taught without book or apparatus, and it ought not to be much longer before the teachers will be able and willing to teach them.

One appropriation will have been entirely exhausted when all bills are settled. While the board has never exceeded its allowance, it has very often, as during these two years just passed, felt the advantage which larger funds would afford. We refer with

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pleasure to the work of these years so briefely summed up in this report. Much of it has been of a character hard to describe but none the less valuable. We are glad to report increasing confidence in the work of the Board founded upon the knowledge of what it has done.

D. W. HAND,
CHARLES N. HEWITT,
V. SMITH,
FRANKLIN STAPLES,
E. J. DAVIS,
CH. GRONWALD,
W. H. LEONARD.

January 1st 1883.

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FINANCIAL STATEMENT.

RECEIPTS FROM STATE TREASURER.

1881			
July 27,	Cash,	$ 319	81
Nov. 21,	"	284	51
1883.			
Mar. 31,	"	584	12
	Salary of Secretary for 1881	554	15
			$ 1,742 59

EXPENDITURES.

Balance due on account of Dec. 30, 1880	$	65
Laboratory expenses	40	80
Stationery	4	40
Postage	39	50
Printing (with paper) note and letterheads	18	65
Book binding	25	75
Books and journals	138	99
Telegraphing	31	09
Express and freight	20	25
Assistant in office and laboratory	248	91
Advertising Sanitary Councils	37	60
Preperations for microscope	90	13
Trichiniscope	2	25
Exchange and check book	2	50
Vaccine virus	88	88
Rents of tents for temporary hospital, Dr. Leonard	22	00
Secretary's traveling and other expenses in epidemics	115	90
Dr. C. N. Hewitt, expenses as delegate to Sanitary Council, Chicago	30	30
Dr. E. J. Davis, expenses as delegate to Sanitary Council, Chicago	41	00
Dr. E. J. Davis, traveling and inspection duty for the Board	68	75
Dr. D. W. Hand, travelling, postage, vaccine, &c	57	25
Dr. Franklin Staples, traveling and postage	29	69
Dr. W. H. Leonard, traveling expenses	6	10
Dr. V. Smith,	14	50

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Dr. C. N. Hewitt, expenses as delegate to American Public Health Association at Savannah, Ga.	101 25	
Dr. A. T. Conley, expenses in charge of small pox for the Board	12 00	
Dr. Brewer Mattocks, services for the Board	15 00	
Secretary's salary for 1881	554 15	
		$1,742 59

RECEIPTS FROM STATE TREASURER.

1882			
June 5,	Cash	$ 257 71	
Sept. 8,	Cash	280 64	
Dec. 15,	Cash	288 04	
1883			
Feb. 15,	Cash	274 41	
Apr. 10,	Cash	269 66	
	Salary of Secretary for 1882	1,000 00	
			$2,470 46

EXPENDITURES.

Laboratory expenses	$ 89 07
Book case for library	14 00
Stationery	1 45
Postage	80 85
Book binding	4 50
Printing (and paper) letter and note heads and envelopes	25 10
Advertising Sanitary Conference	19 10
5,000 copies Laws on Health; 2,500 notices	88 90
Books and journals for library	244 18
Telegraphing	76 50
Express and freight charges	22 28
Assistant in office and laboratory	305 80
Vaccine virus	34 00
Expenses of Sanitary Council, Minneapolis	15 00
W. C. Williston, compiling health laws of State	10 00
E. L. Lane, compiling sanitary laws	50 00
Dr. J. H. Dunn, services in case of small pox	26 50
Dr. E. T. Mc Comb " " "	33 00
Dr. E. J. Brown " " "	61 40
Dr. D. W. Hand, traveling, telegrams, vaccine, postage	67 70
Dr. W. H. Leonard, travelling and other expenses	20 00
Dr. E J. Davis " " "	25 53
Dr. Franklin Staples " " "	36 00

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Dr. C. N. Hewitt, expenses as delegate to Am. Public Health Association at Indianapolis...	30 00	
Dr. W. H. Leonard, expenses as delegate to Am. Public Health Association at Indianapolis...	33 10	
Secretary s traveling expenses traveling on business for the Board in the State.....	56 50	
Secretary's salary for 1882.....	1,000 00	
Total		$2,470 46

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APPENDIX.

CONTAINING

INSTRUCTIONS, CORRESPONDENCE

AND

REPORTS OF HEALTH OFFICERS

RELATING TO

SMALL POX.

1881,--'82.

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DAKOTA COUNTY.

First case occurred May 10, 1881.

Number of cases Variola	2
" " " Varioloid	2
Total	4
Number of deaths	1

DOUGLAS TOWNSHIP.

Report of Dr. A. T. Couley, Health Officer.

CANNON FALLS, MINN., July 25, 1881.

Small pox first made its appearance in this vicinity about May 10th 1881, in the German settlement six miles north of the village of Cannon Falls, town of Douglas in Dakota county, on the state road from Cannon Falls to Hastings. Two children in this first family (Nicoli by name), had the disease, one had variola and one varioloid; both recovered. Before these children were well a daughter of the first neighbor to the south, not more than eighty yards away came down with confluent small pox and died in about one week, she had visited the Nicoli family daily, not knowing that they had small pox. Soon after this a daughter of the first neighbor to the north of the Nicoli family—half a mile away—took the disease, she too had visited the Nicoli family. So there were in all four cases, two at Nicoli's, one in the first family *south* and one in the first family *north*, there was but one death; all these cases were girls.

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At the request of the secretary of the State Board of Health, whom I had notified of the fact as to variola in Dakota county, I visited the locality, took a survey of the situation, called on the doctor at New Trier, a German village near by, gave him vaccine, and set him to work. I also visited both in this and a subsequent visit, most of the families in the neighborhood of the disease, advising in the strongest possible manner *vaccination* and *quarantine*.

Owing to the fact that many seemed indifferent to the danger, I finally wrote the facts to the secretary of the State Board of Health, requesting him to come out which he did, and visited the Catholic priest, and got him thoroughly aroused to the danger and through him the people. And I am glad to state the disease has entirely disappeared.

A. T. COULEY, M. D.

WATONWAN COUNTY.

First notice of outbreak, July 10th, 1881.

Number of cases of Variola	4
Number of cases of Varioloid	3
Total	7
Number of deaths	2

Date of last report, July 18th, 1881.

ST. JAMES.

July 10th, 1881, Dr. C. R. Bacon of St. James, reported by letter to Dr. E. J. Davis, member State Board of Health, Mankato:

"I ran into some small pox to-day, fourteen miles from St. James; have quarantined cases."

Dr. Davis notified the Secretary of the Board.

July 15th. Dr. Bacon writes to Secretary:

"In compliance with your request, I report the facts. So far we have had four cases small pox and three cases Varioloid, some five or six others have been exposed, but have been vaccinated. Two of the Variola cases died next day. The others are lighter. Hygienic surroundings worst possible. Ordered destruction of grain bin

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including contents, in which one patient died, and all clothing and bedding, and taken all precautions I can without putting guard on the premises. Supposed origin, from a family of newcomers, Germans, who three weeks ago landed at Baltimore, and supposed they took it there. First two cases were mild, evidently Varioloid, and seen by no physician (being in vaccinated persons) their character not suspected, until two others, unprotected, took the disease. Great difficulty in quarantine."

July 18th. To Secretary: "Yours of 14th inst. at hand. Have had four cases Variola, three Varioloid and six others exposed who have been vaccinated. The first two cases Variola died, others under medical care recovered, quarantine strict." Asks advice as to the destruction of 60 bushels of wheat and the granary containing it, occupied by one who died of small-pox, as above. Secretary advised: "Fumigate building and contents thoroughly with sulphur, two or three times. Then run grain through a fanning mill out of doors, and I believe it will be safe. If the building is worth the trouble, keep it as above; also bedding and clothing." No further spread of disease.

STEARNS COUNTY.

Townships of Spring Hill, Zion, Getty, Luxemburg, Eden Lake, Farming, St. Martin, Lake George, Lake Henry, Munson, Albany St. Joseph, St. Cloud and Melrose.

First notice of outbreak, Oct. 22, 1881.

Number of cases..... 222

" " deaths..... 34

Last report March 26, 1882.

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TOWN OF RICHMOND.

"A."

Report of Dr. H. Schmidt of the original cases in Stearns County.

TORAH P. O., July 24, 1883.

Chas. N. Hewitt M. D., Secretary State Board of Health, Red Wing.

DEAR SIR: In reply to your inquiry of the 19th inst. relating to the outbreak of the small pox epidemic in Stearns county in 1881, I beg to state the following.

On July 19, 1881, I was called to see some mumps (cynanche parotidea, parotitis) in the family of Martin Nege near Richmond. The children were suffering under some slight febrile disturbances and certainly I thought then very little of their complaint. Again I visited the children on the 21st, when I found them suffering from variola.

On the same day I was called to see some sick children in the family of Henry Ossendorf, and on my arrival there found again two children suffering from Variola, and the old father of Henry Ossendorf, aged seventy-eight, dead. He died of Variola.

Ossendorf was at that time the next neighbor to Martin Nege and the two families visited each other several times each day, in fact they were always together.

On inquiry I found that an immigrant, Joseph Kobe and family, had arrived at Nege's place about eight days before from New York, and had lived there during the whole time. This Kobe's family were quarantined in New York harbor *because of Variola on ship.* None of the Kobe's family had had variola, and none had it after their arrival at Richmond.

At the same visit, i. e. July 21st, I met at Nege's place Stephen Summer, his wife and one child, from the township of Spring Hill, visiting the immigrant family to which they were related. I told them the disease was small-pox, and offered to vaccinate and disinfect them before going home, but they declined. I had vaccinated the child Stephen Summer had with him, and another of his children early in the year, but he refused vaccination at that time

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for his other two children. Now these two last (unvaccinated) children were the first cases in Spring Hill, coming down with Variola in about 14 days after the parents returned home. The vaccinated children, although living in the same rooms, and even sleeping in the same bed with the sick ones, escaped the disease.

In the beginning of August I notified the Supervisors of the town of Spring Hill and the priest, of the character of the disease, and offered vaccination, and ordered quarantine, but these they declined, and the epidemic began from these cases in Summer's family.

At my request the supervisors of the town of Munson (Richmond) quarantined both families, Nege and Ottendorf, and in consequence thereof the spread of the disease was stopped.

I have the honor to be, dear sir,

Your obedient servant,

H. SCHMIDT, M. D.,

Health Officer.

"B."

Letter from Ex-State Governor A. Barto giving the first notice received by the State Board of Health.

SAUK CENTER, MINN., Oct. 21, 1881.

Dr. D. W. Hand, St. Paul, President State Board of Health:

DEAR DOCTOR:—I write to inform you that I am informed, upon what I consider creditable authority, that there are some twenty cases of small pox at Spring Hill, in this county, about sixteen miles from here, and I think the Board should look after the matter.

Whoever comes up I will give all the information I can get.

Yours truly,

A. BARTO.

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Dr. Hand went up and instructed the local authorities what to do, and began vaccinating with bovine virus. A few days after, the disease spreading, Dr. Hewitt, the Secretary, went up and organized the Local Boards of infected township. (See his report.) On his return he sent up Dr. Du Bois and Dr. Scoboria. The following are their reports:

SMALL-POX IN SPRING HILL.

Instructions, Correspondence and Report of Dr. J. A. Du Bois, Health Officer of Spring Hill.

ST. PAUL, Nov. 7th, 1883.

Dr. J. A. DuBois:

DOCTOR:—You will report to the local board of Spring Hill, Stearns County, as their health officer, and you will also act as the physician of the County Board of Supervisors, by whose direction I have engaged you.

Report at Sauk Centre to Mr. Jacques County Commissioner, who will give you all the aid in his power. If he thinks necessary report to the chairman of that board at St. Cloud, (by letter).

After getting to Spring Hill make a careful survey of all families, beginning with the infected. Keep a list of all sick and recovered from Variola and Varioloid. Keep a record of the vaccinations already made, of those you make, and of their results. Insist upon the strict quarantine of the sick and infected, and upon the thorough disinfection of houses, bedding and clothing after death or recovery. Report regularly to me all your official acts. Visit cases in adjoining towns as far as possible, and act with their local boards of health.

Yours, truly,

CHAS. N. HEWITT,
Sec. State Board Health.

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Dr. DuBois went directly to Sauk Centre, arriving there on the morning of the 8th. He was delayed there one day and a half, awaiting the pleasure of the County Board, and reached Spring Hill in the evening of the tenth, at 8 o'clock.

Under that date he writes: "We came by the way of Melrose. I find the condition of things very much worse than expected. They have paid no attention to the sanitary regulations you endeavored to rouse them up to. We found the saloon nearly full, among whom were men from infected families, and other men, some of whom were protected by vaccination and some not. Up stairs was the saloon-keeper's wife convalescent from Varioloid. He and the rest of his family protected by vaccination. I am stopping here; there being no unaffected houses for me to stop at. The people are demoralized. They say they know the disease is bound to spread everywhere and they show no inclination to stop its progress. The board of County Commissioners meet next Tuesday in St. Cloud. Allow me to say that your voice ought to be heard at that meeting. I should like very much to see you before then, but that I suppose is one of the imposibilities. (NOTE—The Secretary of the Board went directly back to the infected district on receipt of this report, closed that saloon and assisted in getting matters into much better order. He also attended the meeting referred to and secured the appointment of Commissioner Jaques to represent County Board in this district.)

Nov. 26th, Dr. DuBois writes more encouragingly: "Small pox seems to be decidedly on the wane in Spring Hill. But one new family in the last 12 or 14 days. It is raging, however, in the town of Lake Henry. Six families down with it. All traceable to the carelessness of one threshing crew. The County Commissioner, Mr. Jacques, has soothed the popular feeling greatly here. He is the right man in the right place. I admire your discernment in "pushing" him for this duty.

December 5th. "We are improving and that very rapidly. There are but 18 persons in Spring Hill to-day confined to the bed by small pox, of whom all but five are convealescent. All cases quarentined by the co-operation of the local board in Lake Henry."

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December, 11. "Shall probably finish my work in Spring Hill by January 1st. The disease is on the wind up in Stearns county. At Spring Hill it is certainly drawing its last breath, and if we can restrain some troublesome ones a few days longer we shall very quickly see the end of it. We 'jerked up' two individuals yesterday with the result of one being fined $100 and the other $25, and the fine moral effect the pounding has had is already plainly discernable. Up to this date *in Spring Hill*, 118 cases, 18 deaths; 29 houses infected, disinfected 17, to be disinfected 12. Cases to-day, 12; of whom all but two are convalescent. In *Lake George* 4 cases 1 death; infected house, 1; disinfected, 1."

Lake Henry, to date, 20 cases; 5 deaths in six houses; disinfected, 1.

Getty, 7 cases; 1 house; no deaths; 1 house to be disinfected.

Zion, one family strictly quarantined.

Dec. 24th. Since last report two more families infected. Both due to almost criminal carelessness on the part of the parents. In one family parents had Varioloid but took no measures to let it be known or to protect the children by vaccination till too late. In the other family all had been successfully vaccinated but one child. They neglected to repeat the operation for that child and it is now down with the discrete variola. No cases outside these families in Spring Hill; one more case in a quarantined family in Lake Henry. But for these acts of carelessness on the part of the people we should not have had so wide-spread epidemic of small pox or so much difficulty in getting at the end of it."

DR. DU BOIS' FORMAL REPORT.

C. N. Hewitt, M. D., Sec'y State Board of Health.

DEAR SIR: November 8th, 1881, under the direction of the State Board of Health, I was put in charge of the epidemic, Small-pox, then raging in the township of Spring Hill, and adjoining townships, in Stearns Co., State of Minnesota. I have the honor of reporting to you the history of the epidemic here until my departure, Jan. 1st, 1882, at which date no new case of the disease had made its appearance for three weeks. The infected district embraced the

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townships of Spring Hill, Lake Henry, Lake George, Getty, Oak, Zion and Melrose. In the last named town the few cases that occured were under the charge of another physician, and I have no record of them.

Upon my arrival in Spring Hill I found existing in the various stages, nearly one hundred cases of Variola. No efficient quarantine measures had been adopted by the people. Infected households were left to supply themselves with necessary provisions as best they could; and this they were doing without any reference to the spread of the contagion. The only aid the sick were receiving, was from the tireless efforts of Rev. Ambrosius Lethart, a priest of the order of St. Benedict, who was residing at Spring Hill. There had been a number of vaccinations performed, but less than one half were effectual. The virus used was bovine and proved to be very unreliable.

Small pox first made its appearance in Stearns Co. late in the summer, at Richmond, in the family of one Martin Nege, where there had lately arrived from Hungary, Joseph Kobbe and family who had but just recovered from the disease before sailing to America; so recently indeed had they recovered that one son was detained by the authorities at Hamburg on account of the appearance of his face, from which the pustules had not entirely disappeared.† Arriving at their destination, the household effects they had brought with them were unbound, and a period of less than two weeks saw Variola successfully inaugurated in the family of their host.

In this immediate neighborhood however, the disease did not spread, owing to sufficient quarantine regulations adopted by the physician located at Richmond. But it was transplanted to another district in the same county in this wise. Several days after the appearance of the contagion in Richmond, the infected family was visited by a relative from the township of Spring Hill, Stephen Summer by name who was accompanied by his wife and one of his children.* Upon hearing that the disease in the house had been pronounced small pox, not wishing to contract the disease himself,

†See Dr. Schmidt's report for correction of this statement.

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and still not inclined to disregard the ties of kinship, he concluded to compromise matters by entering the house and eating his supper, and afterwards sleeping over night in a granary upon bedding carried thither from the house. The next morning he returned to his home, and thirteen days after one of his children—peculiarly enough not the one he had taken with him (because protected by vaccination. H.)—was taken sick with Variola.

This was the first case in the township of Spring Hill. The inhabitants of this township are, with the exception of a single family, German. The heads of nearly all of the families were vaccinated in their fatherland during infancy. A large percentage of the adult male population have served in the Prussian army where they were re-vaccinated. It is worth while to notice what immunity this entire class enjoyed during the epidemic which found its victims almost wholly among children, and young women and men born in this country.

The people are very social in their habits, visiting freely from house to house though the country is not thickly settled. The entire population attend church. Holding hasty opinions very tenaciously they were loth to admit that the disease in their midst was small pox, giving it every other name, calling upon no physician; and it was not until there had been some twenty-five cases, with several deaths, that the outside world became aware of its existence.

From Summer's the contagion spread rapidly. A threshing crew here entered the house for their meals, and thus within a short period there were several infected houses in this neighborhood. In all of the numerous cases that followed there was no trouble in definitely tracing the source of the infection. In the family of Henry Emmel, distant three miles from Summer's, there was soon another nucleus of the disease. Inquiry ascertained that a short time previous to its appearance here, a little girl in the family had sat in a pew at church with a little daughter of Mr. Summer's. [illegible]

Into the township of Lake Henry the disease germs were carried by young men visiting the saloons in Spring Hill, and were spread

* See Dr. Schmidt's report for details.

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in this new locality by the heedlessness of threshing crews. At Spring Hill no efforts were made on the part of the people to stay the epidemic. The saloons counting among their patrons almost the entire population were visited simultaneously by people from infected and uninfected houses. In the same manner the church here was opened each Sunday to all. The indifference displayed to the presence of the contagion in their midst was indeed wonderful. And it was not until the importance of vaccination as a preventive was impressed upon the priests of this and surounding districts, personally by the Secretary of the State Board of Health, to whom the existence of the epidemic had at last been reported, that any means whatever were taken to check the flames.

On my arrival at Spring Hill I found the people generally speaking, singularly averse to anything being done in their behalf; they held strongly to the opinion that the contagion could not be checked. "It was," as they expressed it, "bound to go everywhere," and they had no desire to be quarantined. They were extremely opposed to vaccination, having no faith its protective power, and believing it to be productive of amputated arms, deaths, etc.

After my first two weeks with them until my departure, I received invaluable aid from County Commissioner A. G. Jacques, of Sauk Centre, who was appointed to my assistance by the Board of County Commisioners at their regular meeting. Resolutions were adopted by them at that time inflicting penalties for breaking of quarantine regulations; and full power was given us to procure all needed supplies and help at the expense of Stearns county.

The infected district was placed under strict quarantine. No person was allowed to visit other towns without a certificate testifying to his freedom from infection, signed by myself as health officer. All members of infected households were obliged to remain upon their premises, and parties were hired to supply them with wood and all necessary provisions. Nurses were engaged for the sick. Vaccination from the begining was performed as rapidly as possible upon all unvaccinated persons, and those not recently or successfully re-vaccinated. Bovine virus was thrown aside entirely.

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The record it had made for itself, its utter unreliability, and the necessity of dealing with the people in no uncertain way compelled a resort to humanized virus. For convenience the form used was the crust dissolved with a little glycerine or glycerine and water. In the selection of these crusts great care was exercised. They were generally taken from the arm of a healthy young child, and it was made a rule to secure only the clean cut, smooth, medium sized, mahogany-colored, typical vaccine crusts. All large splashing ones were discarded. With this humanized virus, the vaccinations were very successful. It displayed great celerity in its operations; and no unduly sore arms were produced. Every unprotected person that it was possible to reach was vaccinated. Members of infected households were vaccinated without any reference to the length of time they had been exposed to the contagion, provided they themselves were showing no symptoms of the disease, with the view, which was many times realized, of mitigating the attack.

In the treatment of the Variola the remedies used were few and simple. A case that was doing well enough was let alone. Undue cerebral excitement received full doses of potassic bromide. At the time of the suppuration fever tonic doses of sulphate of quinia were generally administered. The cutaneous surface was kept freely anointed with cosmoline. No pains were taken to prevent pitting of the face, for the simple reason that the inhabitants of this region counted all such efforts among the vanities of this world, and preferred rather to come out of the war bringing their scars with them.

When great swelling of the mucous membrane of the throat occurred, producing dysphagia and dyspnœa, resort was had to swabbing well the inflamed surface with a hot solution of tannic acid in glycerine.

January 1, 1882, there had been in the townships of Spring Hill, Lake Henry, Lake George, Getty, Oak and Zion 159 cases of small pox, with twenty-six deaths.

Of the number of cases, Spring Hill furnished 124; of these thirty-five were of the *confluent* type; twenty-five *varioloid*; and two more properly diagnosed as *purpura variolosa*. There were

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nineteen deaths; of these six were infants, and one a woman who died from the effects of the disease, a few hours after being confined.

In the township of Lake Henry there were nineteen cases; of which five were *confluent*, two *purpura variolosa*, and six *varioloid*. The number of deaths were six, to which might possibly be added another which occurred a short time after, that of an old man aged seventy-six, who survived the course of a mild form of variola discrete, but fell into a typhoidal condition to which he succumbed.

Of these six deaths one was from scrofulosis and variola.

In the township of Lake George there were four cases of small pox: of these one was *confluent* in character, and one *varioloid*. There was one death.

In the township of Getty there were eight cases; no deaths.

In the township of Oak there was one case, which was varioloid in type.

In the township of Zion there were three cases, one of which was *confluent*; no deaths.

I have mentioned before the immunity the adult population not born in this country was favored with. Of these 159 cases of Variola in its various stages, 13 only were of foreign birth. These 13 had, none of them, been vaccinated since infancy. Of their number eight were *varioloid*, and one *confluent*. This latter proved fatal, and presented the only instance during the entire epidemic, of death occurring from small pox where there was a history showing a previous vaccination at some period in life.

As the history of the pestilence in the family of which this man was the head furnished me with cases of the disease in its most violent form, and also with the strongest proofs of the efficiency of vaccination as a preventive, with one interesting instance of a somewhat exceptional character, I will endeavor to report it in full:

Quirin Loehr, aged 43 or 44, was of German birth, and came to this country while in childhood. He was vaccinated in infancy, and never revaccinated until three days before he was taken ill with Variola. He was exposed to the contagion while threshing at Stephen Summer's. The disease with him developed into a

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severe form, confluent in variety, and he died after being sick seven days. His family consisted of a wife and five children. His wife had been vaccinated at 16 or 17 years of age. Three days before his illness, his children were vaccinated with bovine virus, which bore fruit only with two of them. The three children with whom the vaccination was ineffectual were taken sick, one after another, with Variola confluent, and all died. The two children, with whom the vaccination was successful, and the wife, went through the entire siege without displaying a single symptom of the disease.

About the time of the death of the husband, the family was visited by a sister of the wife, a young lady aged 18, who remained. She had never been vaccinated, but was, three or four days after her arrival, by Father Ambrose.

I saw her for the first time upon the eighth day after her vaccination. Upon examination of her arm, I found a typical vaccine sore in full process of development, the vesicle being then well distended with lymph. In response to my inquiries she said that with the exception of her arm she felt very well. I felt justified, by my previous observations, in assuring her that if she incurred the disease at all, it would probably be a very mild form. I proved, however, to be a false prophet; for the next day, being the ninth after vaccination, she displayed symptoms of Variola, which assumed the confluent type, accompanied with great swelling of the pharyngeal and layrngeal mucous membrane, and ulceration of the cornea.

Her symptoms were all of the gravest, nor from first to last, could I discover a single mitigating effect from the vaccination, unless, through some undiscernible influence, to it may be ascribed her final recovery.

This case was remarkable as being so great an exception to the general rule observed in my experience with vaccination during the epidemic.

Our chief instrument in staying the epidemic was vaccination. Without it the task would have been extremely difficult.

Each house as soon as clear of the disease was disinfected as thoroughly as possible. About two pounds of sulphur was ignited in each room, and all clothing and bedding not destroyed, were

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dipped into a hot solution of chloride of zinc. But the infected territory was large, and the proof that the disease germs were not totally eradicated from this region is the fact that subsequent to Jan. 1, 1882, there have been two cases of small pox, according to report, in Spring Hill among new-comers, one of which resulted fatally.*

I cannot close this report without bearing testimony to the very great service rendered by the priests of the order of St. Benedict in this and adjoining districts, in staying the epidemic. Father Ambrose at Spring Hill, whose efforts in relieving the sick in that country were extraordinary, performed a great many vaccinations. Father Meinhardt at Merer's Grove vaccinated the entire population of the township of Grove, and gave us a most effectual barrier to the spread of the contagion northwards. Father Augustin at New Munich in the town of Oak did similar service.

Respectfully submitted,

J. A. DU BOIS, M. D.,

Health Officer Town of Spring Hill, Stearns Co., Minn.

SAUK CENTRE, MINN.

*See report of the new outbreak by Dr. H. Schmidt further on.

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ABSTRACT OF THE REPORTS OF

Dr. J. E. Campbell, Health Officer of Melrose, Stearns County, 1881–82.

SMALL POX IN MELROSE, DR. J. E. CAMPBELL, HEALTH OFFICER.

Nov. 3d, 1881. Case of Variola imported from Spring Hill, quarantined and cared for. A woman—miscarried and died. At this date Dr. Hewitt visited and consulted with the local board. He urged vaccination upon Rev. Meinard Leuthard, O. S. B., who had been exposed in attendance upon the first case, and who refused to accept it at first, but finally submitted on the 3d of November.

Nov. 15th, 1881. Rev. Leuthard down with Varioloid. Arm sore in five places, and he died on Nov. 28th.

Nov. 28th, 1881. No more new cases, but quarantined attendants on Bro. Leuthard.

Nov. 29th, 1881. The priest attending Bro. Leuthard taken down.

Dec. 2, 1881. The housekeeper of Bro. Leuthard sick, both she and the priest, recovered.

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Dec. 28th, 1881. Village free of Variola, only for importation from Spring Hill.

Jan. 7th, 1882. A new case, an elevator workman; probably from handling Spring Hill grain bags.

Jan. 16th, 1882. Case dead, no new development. House and family quarantined.

Jan. 24th, 1882. One more case in quarantined house.

Jan. 26th, 1882. Another in same house.

March 15th, 1882. House disinfected. No more cases since last date.

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REPORT OF

C. Q. Scoboria. M. D., Health Officer in charge in Henry and Zion Townships.

NOTE.—Dr. Scoboria was placed in charge of towns of Henry and Zion as Health Officer, Nov. 13th, 1881, by the Secretary of the State Board of Health.

Dr. Chas. N. Hewitt,

DEAR SIR:—My work in the small pox epidemic in Stearns county was chiefly confined to vaccination and the quarantining of infected families.

During the first week I visited several cases, but they were subsequently committed to the care of Dr. Dubois, who was stationed at Spring Hill. I began work in the town of Lake Henry, Stearns county, Nov. 15, 1881, and was engaged in the work twenty-three days. After vaccinating in Lake Henry I went to the neighboring town, Zion. I was assisted there by Father Loetke, of St. Martin. I instructed him in the method of vaccinating, and found that he had excellent success. I found that the disease had but recently invaded Lake Henry, and the people were demoralized. They dreaded small pox, but they dreaded vaccination quite as much. The clergy were doing good work in the way of vaccination and the care of the sick ones, and disposing of the dead in the quietest manner.

Circumstances favored the arrest of the disease as there was no store or saloon in which crowds might congregate, and the only church in the place had been closed several weeks. Parents refused

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to send their children to the schools, and accordingly they were closed for lack of scholars.

The disease was spread by threshing parties. In the first case which occurred a party of men were threshing near the house, some of whom visited the patient and assisted in nursing and burying him. Eight cases followed as the result of this exposure—the majority of the party being unvaccinated.

The town authorities had taken no action tending to the arrest of the disease. I found them willing to co-operate with me in quarantining all infected families and such as refused to be vaccinated. These resolutions, and the regulations adopted by the county commissioners, had a wholesome effect on the minds of the people.

All the inhabitants were vaccinated with the exception of four families. These refused, and were promptly placed in quarantine. Such as could leave their homes were vaccinated at the school houses and the remainder visited at their homes. I vaccinated about 300 individuals and Father Loetke about the same number.

I used animal virus at first. Subsequently I took the lymph off healthy children on the ninth day, thus getting an unlimited supply of human virus. I also used the crust taken from the twenty-first to the twenty-fifth day, and found that it worked admirably. Most of the older inhabitants had been vaccinated in their native country and presented from three to six well-marked cicatrices on each arm. I found that vaccination did not succeed on such. The children and young adults had never been vaccinated.

My method was to expose the *cutis vera* in three or more places on the left arm and rub the virus well in, allowing it to dry before dismissal. My percentage of failures, as far as I could ascertain, was very small, not above four per cent. Very little constitutional disturbance attended the vaccination. It was chiefly confined to infants and small children. Roseola was developed in several cases at the end of the first week, covering the whole body, and attended with itching and slight febrile symptoms.

When I commenced work there was one case of small pox in Zion and four in Lake Henry. There were no more cases in Zion

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but eight new cases occurred in Lake Henry. Of these thirteen cases, four were fatal. One died on the eighth day, another on the fourth, and a third on the sixth day of the disease. Three of the fatal cases were confluent. In the fourth there was never any eruption. Of the fatal cases, all had been vaccinated with variable success.

As the result of my observation I think vaccination does not modify the development of Variola if the patient is taken sick within a week after the vaccination is performed. In vaccinating, I tried to get three or more good cicatrices, believing that the greater number of cicatrices obtained the greater is the immunity from small pox. Very respectfully,

CHAS. Q. SCOBORIA, M. D.,
Health Officer town of Zion, Stearns Co., Minn.

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REPORT OF

W. L. Beebe, M. D., Health Officer Town of St. Cloud.

On the 10th day of November, 1881, I was requested by Dr. C. N. Hewitt, Secretary of the State Board of Health, to vaccinate, as soon as possible, a school of sixteen children in the town of St. Cloud.

The teacher, who had been exposed to small pox, in Spring Hill, had been taken from the school room, sick, ten days prior to this, and had been treated for Variola, during this time, by Dr. G. S. Brigham of St. Cloud, who also afterwards treated the nurse, his sister, during a slight attack of Varioloid.

I vaccinated fifteen of the sixteen on the 12th. The parents of the sixteenth refused to have her vaccinated; which trouble then, and all similar ones thereafter, was obviated by a request to the parish priest, to see that the party was either vaccinated or kept within doors.

By the way, too great credit cannot be given the clergy, throughout the county, for the very valuable assistance rendered the medical workers, during the entire epidemic.

On April 11th, 1882, J. H., a grave-stone dealer, returned to St. Cloud, from Spring Hill. After frequenting many of the saloons during that day and night, on the morning of the next day he sent for Dr. A. O. Gilman, who treated him for ten days, at the expiration of which he died with confluent small pox. His mother and sister were both treated by the doctor for Varioloid in mild form.

Owing to a perfect system of quarantine, the disease was confined to these two houses.

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REPORT OF

Dr. Beebe as Health Officer of Town of Albany, Stearns Co., Minnesota.

As Health Officer of the town of Albany, I treated ten cases in two families.

A young man who had the small pox in Spring Hill, and had been properly disinfected and provided with new clothing, had returned to his home in Albany, with some of his old clothing, which he had secreted, and which was supposed, by the health officer, to be destroyed. Within two weeks after his return his sister was taken with Variola. Dr. McMasters, of Sauk Centre, was called, and vaccinated the family with the exception of an infant, which the mother refused to submit to the process. Three older boys, and the mother, all of whom had been vaccinated previously, were in constant attendance upon the other six, shut up in two little rooms in a log hut. They escaped. Of the vaccinations of Dr. M., three were successful, and the subjects had Varioloid. Two unsuccessful and the unvaccinated infant had small pox in terrible form, although the entire family recovered.

This history is certainly a very striking illustration of the efficacy of vaccination. During the illness of the first case in this family, one of the neighbors came to the house and merely opened the door and when told of the case, immediately withdrew. Within ten days I was sent for by him. Found Variola, and vaccinated his children, three in number, all of whom had varioloid. The man died after a week's illness, being the only death out of the ten cases. I was sent for to bury him.

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Although every effort was made to secure general vaccination throughout the county—competent vaccinators visiting every town and offering their services free—there yet remain many settlements in which they not only neglected to take advantage of the opportunity, but threatened armed resistance to anything pointing to compulsory vaccination. These communities to-day furnish just as fertile fields for a repetition of our late scourge as did Spring Hill and vicinity last year.

At the commencement of the outbreak Stearns county had special law passed constituting the board of County Commissioners a county health board. The county board of health would *direct* physicians and others to perform certain work, and at subsequent meetings of the board as commissioners, they would allow from one-third to two-thirds of the amount of the bills rendered by the physicians, on a basis of the regular fee bill, for a similar amount of labor performed treating any other disease. An appeal was then taken from such an allowance, and the physicians are as yet unremunerated for their services, except by the kicks and curses of the majority of those subjected to quarantine, together with a loss of private practice consequent upon their known attendance upon small pox patients.

W. L. BEEBE,

Dec. 26, 1882. ST. CLOUD, MINN.

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LAWS OF 1881.

CHAPTER 104.

AN ACT TO AUTHORIZE THE COUNTY COMMISSIONERS OF THE COUNTY OF STEARNS TO TAKE MEASURES TO PREVENT THE SPREADING OF SMALL POX.

Be it enacted by the Legislature of the State of Minnesota:

SECTION 1. The Board of County Commissioners of the county of Stearns are hereby authorized to adopt such rules and regulations concerning vaccination, quarantine and other preventive means to restrain and prevent the spreading of small pox in said county, as they may deem proper.

SEC. 2. For the purpose of carrying out the provisions of this act, said board may convene at any place in said county, when necessary, upon twelve hours notice given by the chairman, and may appropriate such sums of money as may be needed, out of the revenue funds of said county.

SEC. 3. Doctors B. R. Palmer, A. O. Gilman, J. M. McMasters and W. L. Beebe, of said county, shall constitute the Advisory Board of such county commissioners in all matters pertaining to such rules and regulations.

SEC. 4. Such rules and regulations shall after adoption be posted up at the usual place of holding elections in each town or city of said county, and shall thereafter be in force in the town or city where so posted, until rescinded by said board of commissioners.

SEC. 5. Any person violating any of said rules or regulations, in any town or city where the same have been posted as aforesaid, shall be guilty of a misdemeanor, and shall upon conviction thereof, be fined not to exceed one hundred (100) dollars, and in default of payment thereof shall be imprisoned not to exceed ninety (90) days in the common jail of said county.

SEC. 6. No rules or regulations so adopted shall be considered as superseding or abrogating any rule or regulation adopted by any board of health of any town or city in said county.

SEC. 7. This act shall take effect and be in force from and after its passage.

Approved November 4, 1881.

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CHAPTER 75.

AN ACT TO AMEND AN ACT ENTITLED AN ACT TO AUTHORIZE THE COUNTY COMMISSIONERS OF THE COUNTY OF STEARNS TO TAKE PRECAUTIONS TO PREVENT THE SPREADING OF SMALL POX, APPROVED NOVEMBER FOURTH (4TH), EIGHTEEN HUNDRED AND EIGHTY-ONE (1881).

Be it enacted by the Legislature of the State of Minnesota:

SECTION 1. That section six (6) of an act entitled an act to authorize the County Commissioners of the county of Stearns to take precautions to prevent the spreading of small pox, approved November fourth (4), eighteen hundred and eighty-one (1881) be and the same is hereby amended so as to read as follows:

Section 6. That whenever any rule or regulation made and adopted by said board of County Commissioners, under the provisions of this act, shall conflict with any order, rule or regulation of any board of health of any town in said county, it shall be treated and considered as superseding and abrogating that of the board of health of said town.

SEC. 2. This act shall take effect and be in force from and after its passage.

Approved November 17, 1881.

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NEW OUTBREAK OF SMALL POX IN STEARNS CO. AFTER JANUARY 1st, 1882.

Reasons therefor and management of, by H. Schmidt, M. D., Health Officer of the Town Richmond.

RICHMOND, MINN., August 5, 1883.

Chas. N. Hewitt, M. D., Red Wing,

DEAR SIR:—Your favor of July 27th is at hand. Regarding the new outbreak of the small pox epidemic in January, 1882, I beg to state that in almost all cases the origin of the disease could be traced clearly to the same cause, *i. e.*, insufficient disinfection of houses, or of wearing and sleeping apparel of patients formerly affected with small pox. To illustrate this the following statement will prove the correctness of my assertion:

On January 14th, 1882, John Schmitt, a prominent farmer of the town of Zion, searched for strayed cattle in the town of Zion and town of Spring Hill. Being late he went to the store and saloon of Michael Weyer, in Spring Hill, and stayed there over night. He slept in a bed which was formerly used by Weyer and his family whilst they were afflicted with small pox. Next day John Schmitt went home, and a few days later made a visit to his brother-in-law, Mich. Weber, in the town of Luxemburg. Here he fell sick and died of small pox on February 1st. A child of Schmitt, living with the mother on the farm in the town of Zion, got at the same time small pox.

Andrew Weyer, in the town of Zion, visited with wife and child-

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ren his brother Michael Weyer—the above-mentioned store and saloon keeper—in Spring Hill, and very shortly afterwards the whole family were suffering with Variola.

Joseph Walz, a bookkeeper in a large store in Cold Springs, went on business to Michael Weyer, in Spring Hill, and a few days later complained of backache and fever. Before Mr. Walz—himself a homeopathic practitioner—knew the nature of his disease, his wife and children, his father-in-law and his brothers-in-law (Kirchner and Richmond), the families of his neighbors Gertz and Schatz, were afflicted with small pox.

Joe Herschbach, owner of a marble yard in St. Cloud, visited Spring Hill on business and stopped over night at Michael Weyer's place. Eight days afterwards Herschbach was a dead body, dying of small pox at St. Cloud.*

Michael Schwartz, in Lake Henry, visited the family of Mich. Schuler, in town of Zion, formerly afflicted with small pox, and shortly afterwards his son came down with the same disease.

John Thuringer, in town of St. Martin, visited the same family, and the consequence was that he lost three of his children with small pox.

After these stated facts there can be no doubt that the new outbreak of the small pox epidemic was due to insufficient disinfection.

Having now mentioned the causes for the outbreak of the new epidemic of 1882 in the county of Stearns, allow me to state a few facts in order to show how easily and sometimes recklessly the disease was spread.

In the town of Luxemburg, as well as in the adjacent towns of Rockville and Wakefield, not a single case of small pox had occurred during the epidemic of 1881. It was therefore not suprising that people doubted the correctness of my statement that John Schmitt, staying with his brother-in-law, M. Weber, in Luxemburg, suffered of small pox. Amongst other people, Nic. Post, a neighbor of M. Weber, had also some doubt about this small pox business, and in the night of February 1st, he managed to avoid detection by the quarantine watchmen, stole to the house of M.

*See Dr. Beebe's report *ante*.

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Weber and had a look at the dead body of John Schmitt through the open window. The consequence of his proceeding was the infection of his whole family (seven persons) with Variola.

Nic. Post being very neighborly and practicing much hospitality shortly after his nightly exploit, invited some of his friends, passing on their way to his house, to a glass of beer, having procured a keg of beer from Cold Springs. They accepted his invitation, but a few days afterwards small pox appeared at their places in the towns of Luxemburg and Eden Lake.

But regarding the prevention of the spread of the disease, great praise and credit is due to our County Commissioner, Barth. Perz, for his unceasing, untiring and energetic actions during the whole time of the epidemic. His zeal to quench the disease, was as conspicuous as his skill and good judgment he evinced in the management of all matters concerning the prevention of the epidemic. In all new cases of Variola, not only the infected families were quarantined, but also all persons who were found on the premises of such infected houses, no matter if they were there only by chance, or by a desire to assist their neighbors in their troubles. For a longer or shorter period these latter people were quarantined for the sake of observation. And Barth. Pirz, with the risk of his own life, enforced quarantine or preventive measures, and this with the most happy results. To him it is due that despite the extent to which the disease had spread in so short a time, we soon had the epidemic entirely under our control.

Not less praise and credit is due to Commissioner Barth Pirz for his effectual assistance in aiding me by disinfection. We never took this matter in a slight way of hand. Wearing and sleeping apparels (such as feather beds) were destroyed by burning, every other article in the house was exposed for hours to the disenfecting action of sulphurous acid gas. Walls and ceiling were whitewashed, the whitewash (lime) previously mixed with an abundant supply of chloride of zinc. With a good conscience I can state that in houses so disinfected no live germ of the disease is to be found.

But when Mr. Pirz worked here by day and night, in wind and weather, spending time and money, risking his life and the lives of

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his wife and children, the chairman of the county board had only to send orders to go here and there, and after the epidemic was subdued, to refuse the payment of our well-earned money. An appeal to the district court had the same effect, despite the fact that the commissioners decided that every commissioner in his district should use all means to prevent and arrest the spread of the small pox epidemic. The Judge (Crosby) ruled that no commissioners had the power to employ doctors, watchmen etc., unless such action is recorded in the proceedings of the county board at regular sessions. * * * * * *

I have the honor to be

Dear Sir,

Your obedient servant,

H. SCHMIDT, M. D.

Health Officer.

Under date Sept. 20, 1882, Dr. Schmidt reports an isolated case of variola in an immigrant girl aged fourteen. Quarantined, etc.

Oct. 14. Case has terminated favorably and no new cases.

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HOUSTON COUNTY.

TOWNSHIPS OF HOKAH, LA CRESCENT AND UNION.

First notice of outbreak, Nov. 9th, 1881.

Number cases Variola	16
" " Varioloid	19
Total	35
Number of deaths	6

Date of last report, April 4th, 1882.

SMALL POX, HOUSTON COUNTY, 1881.

November 2. Thos. Collins, a resident of Hokah, returned from Bellevue, Iowa, where he had been at work. He reported that in the family where he boarded there were six other cases of small pox, one Varioloid, the rest Variola. He was sick when he reached home.

Nov. 9. The Secretary of the State Board of Health saw in the Pioneer Press a telegram from Hokah, reporting a case. Telegraphed to chairman of the local board of health, who reported one case; Dr. Train in attendance.

The Secretary went to Hokah. Met local board of health. Established regulations as to quarantine and vaccination, and left a crust of humanized virus for use of persons exposed.

Nov. 11. Received notice of the appointment of D. S. C. White as health officer for the *village* of Hokah, and received letter from him asking for further instructions.

Replied: "Dr. Train will attend infected family. You must

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have healthy humanized virus now on children from vaccinations made eight days ago. Be careful and collect that and use it as more speedy and certain. Look carefully after the quarantine of infected family." The patient died at this date and was privately buried that night. Dr. Train reports disinfection of persons and things by himself.

Nov. 15. Dr. Train reports two other cases in same family, (children) vaccine (animal) working well in two children, humanized in three, and one not taking. He is appointed health officer for the *town* of Hokah.

Nov. 18. Reports all the children (6) as coming down with Varioloid, with varying degrees of intensity.

Dec. 17th. Dr. Train reports the children all doing well, and will be able to disinfect on the 20th.

Dec. 28. In answer to letter from the Secretary Dr. Train reports a suspected case quarantined in adjoining town of La Crescent, but proved not to be small pox. No new cases in original family. All well. Children mentioned above were saved by vaccination in that they had mild Varioloid, and not Variola.

Jan. 1, 1882. A. H. Brayton, chairman local board of health of La Crescent, writes in reply to instructions as to quarantine of suspected cases, and as to general vaccination, that he attempted to get his board together to take proper measures, but they did not respond. He immediately set an example in vaccinating himself, his family and hired men, and went round his town urging it upon the people with fair success, setting an example of faithful performance of duty, of which it is proper to make mention here.

January 24, 1882. Dr. Train, health officer of Hokah township, reports three cases just across Root river from Hokah village, and in eruptive stage. Proceeded immediately to notify the board. Later in the day telegraphed the Secretary: "The local board refused to do anything in the matter unless notified by the State Board of Health."

Jan. 25. Secretary telegraphed to chairman of board: "Atte to the cases of small pox in your township *immediately*, an

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report action by telegraph," and telegraphed Dr. Train to serve the notice and report by telegram.

Jan. 26. Dr. Train telegraphed: "The board have taken hold of the cases of small pox." As illustrating the doubts and difficulties of local boards of health, we quote the explanation given by the chairman of this board: "The reason of my hesitation in acting as to these recent cases was a fear of imposing on our township a heavy debt. In the first case (Nov. 2d, '81) the County Commissioners refused to allow our bill, the person sick being unable to pay. The commissioners were obstinate. I was obliged to employ a lawyer to instruct them in their duties." The county finally allowed $571.61 for the small pox expenses of the town in the single family which suffered from small pox in November and December, 1881. Seven cases and one death.

Feb. 2. Health officer (Dr. White) of Hokah *village* reports a case of Varioloid in the village brought by persons comcoming from neighborhood of cases reported above in Hokah township. Quarantined it, but considerable exposure before discovery.

Feb. 2. H. E. Brooks, member village council of Hokah village, writes to secretary for advice as to quarantine against infected district to the north. Secretary telegraphed to health officers White & Train: "You can control the disease by co-operation. Please do it and telegraph decision." Answer from Dr. White: "Dr. Train and I will co-operate." Wrote also to them and to other boards.

Feb. 3. Dr. Train writes: "Small pox in three families across the river and one in the village. Please come down and give us help and advice."

Feb. 4. He writes again: "Things look better."

Feb. 6. Dr. White reports case in town, very mild. All unvaccinnated children kept out of public school.

Feb. 11. Applications to the State Board of Health from adjoining towns against Hokah and demanding more quarantine.

Feb. 16. Telegram from chairman Hokah village council: "Want you to come immediately. New cases, and physicians do not agree."

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Answered: "Dr. Staples, of Winona, member of this board, will come down to-morrow." The secretary having to go to Stearns county, Dr. Staples kindly went to Hokah in his stead.

Dr. Staples' report is as follows:

He met the various boards and health officers, and they reported twenty-five cases Variola and Varioloid in and about Hokah, Feb. 17, 1882.

In the village of Hokah	1
" " town of "	10
" " " " La Crescent	5
" " " " Austin	9
Total	25

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HISTORY OF

Variola in Vicinity of Hokah, Houston county, Minn., from Nov. 1, 1881, to Feb. 17, 1882.

About the first of November, 1881, a young man came from Bellevue, Iowa, to his home near the village of Hokah. He was sick at the time of his arrival, and it was soon discovered that his disease was small pox, and the case proved fatal. There were five others in the family. All had the disease in some form, and one other death occurred, that of a younger brother of the one who brought the disease home. A priest from a convent situated in an adjoining town across the river three or four miles distant, visited the first patient shortly before he died. In about ten days the priest had a slight indisposition, but was not very sick. A few days after the slight illness of the priest one of the sisters in the convent was taken sick, grew worse and died. Her disease was called scarlet fever. A hemorrhage occurred, which is said to have been the immediate cause of death in the case. It was some kind of eruptive disease.

In about two weeks after the death of the sister in the convent an Irishman, aged about 55, living about one-half mile from the convent, who had assisted in the attendance upon the sister, was found to have small pox. I am not able to state how this case resulted.

About the same time, or during the time of the sickness of the Irishman, a German woman named Engster, who lived about a mile from the convent and who had also attended the sister who died, was taken sick, but recovered without serious illness. Her child was soon taken sick and died of small pox. Other cases occurred in the family which did not prove fatal.

Several neighbors visited this family and were present at the

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burial of the child, and small pox soon appeared in five or six families, about twelve cases occurring. Thus far there were now and had been about twenty cases, all occurring in the neighborhood of the convent, excepting those in the family of the first cases near the village of Hokah.

While the disease was in the Engster family, Mrs. Engster came to the village of Hokah with butter which she offered for sale in a store. A clerk, Mr. Baker, received the butter and traded with the woman. In ten days he was taken sick and had a slight eruption. His disease was pronounced Varioloid. He was sick at home with his family. The family were vaccinated. No cases resulted.

A man named Franklin had been with his wife on a visit to Canada. Very soon after they returned Mrs. Franklin happened to be in the grocery store when Mrs. Engster was trading with Mr. Baker. She was taken sick at the same time Mr. Baker was. This was about the first of February. On the 10th of February, or about that time, the whole Franklin family became sick, ten in all, and are now sick, February 17. The Franklin family resides in the country, about three miles from the village of Hokah in an opposite direction from the Engster family and on the other side of the Root river. A sister of Mrs. Franklin, living in the village of Hokah, is also sick with small pox. The latter case, with one or two of mild Varioloid possibly, is all of the disease at present in the village.

February 22. Petition from citizens of village of Houston, Houston county, asking the State Board to quarantine Hokah and adjoining towns.

February 23. Dr. White, H. O., of Hokah village, made following report:

Chas. N. Hewitt, M. D., Sec'y, &c., Red Wing:

DEAR SIR:—Replying to your favor of 22d instant, the spread of the disease (small pox) at and around the convent can only be accounted for, I think, by supposing that some of the earlier cases were not recognized. Dr. Train is their physician at the convent. He told me, some time after, about the sister who died

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there. He thought her case unmistakably scarlet fever, but I judge the eruption was peculiar from the first, there being some petechial spots. Uterine hemorrhage supervened on the third day of the eruption, from which the patient died. This case occurred *about* 4 weeks after the visit of the priest to Cullens (the first case, Nov. 2d, 1881). It is understood that the priest was very slightly indisposed for a day or two about two weeks after the said visit, but, I think, had no eruption, and did not call a physician. The next case was that of Horihan, a man 50 years of age, mild, from which no contagion can be traced, (Dr. Train reports that case not Variola, H.) his own family not contracting the disease as I have heard. Then we thought everything clear, until surprised one day, probably four weeks or more after Horihan's recovery, to hear that the disease had appeared in two or more German families on the other side of the convent from Horihan's. I do not know whether any official is at fault in the matter. I believe Dr. Train acted in good faith and according to his best judgment in all cases coming to his knowledge, but the disease got away from him somehow.

Respecting the outbreak west of us, in Union Valley, opinions differ as to the source of contagion. The first case there, Mrs. Franklin, came from Canada, that is undisputed. But I understand she claims she was in C. E. Joys' store, in Hokah village, at the time the German woman from across the river was there with butter, (Jan. 13th) but C. E. Joys claims that she was not in the store, but merely came to the door, inquired for something, and went away. She was taken sick, I think, at about the right time to have contracted the disease then. It would have had a rather long incubation to have been contracted on her trip from Canada, as she arrived home about Jan. 4th. At the time of this German woman's visit (Jan. 13) no one in town had any knowledge of the existence of the disease anywhere in the vicinity.

As to what we are doing; we are principally waiting. A large number of town people saw Mrs. Dibbell (the woman now sick in town) during the primary stage of her attack, and after the eruption appeared, Sunday, Monday, Tuesday and Wednesday of last

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week, Feb. 12th to 15th. On Thursday morning the nature of the case appears to have been discovered by her doctor (Holden) and the place was quarantined. Those who were known to be exposed have been ordered to keep themselves close, and will be watched at the proper time. We may undoubtedly expect some cases to develop within the next five days.

As to the chicken-pox case; Dr. Holden was the only physician who saw it, and he, as I understand, went to the house, not to prescribe for that, but to vaccinate some children. The children had been having "chicken pox" one after another, for four weeks, not very sick. The young man felt slightly ill two weeks or more ago, and a slight eruption appeared, but "went back", and he returned to his work. A week later the case developed again, as I wrote Dr. Staples. The family still think, and I have heard Dr. Holden agrees with them, that it is "chicken pox." The house is quarantined, however.

I think you had better come down and investigate our condition and prospects, personally, before acting on the petition of our Houston friends. Very respectfully, &c.,

S. C. WHITE.

September 24th. Secretary wrote to Dr. Train to report condition of convent and school attached; to enforce vaccination and detail all cases of sickness there or thereabouts. Also to Dr. White, to invite health officers of adjoining towns to come to Hokah for consultation and to establish a mutual understanding so necessary in times of distrust and panic.

September 28th. Dr. White telegraphs: "But one case in town; nearly recovered. No new cases in town or vicinity;" and writes: "None exposed to Mr. D. have come down. Family still in quarantine. Cases in Hokah township all well; those in Union Valley doing well. Many cases of measles, which frighten no one."

March 1st. Dr. Train reports: "Difference of opinion as to suspected cases of Varioloid in Hokah village. Vaccinated and re-vaccinated in October and November last, every one connected with convent and school except an invalid sister and the priest, who

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refused vaccination, and repeated till all had worked where there was any susceptibility. Have visited them from time to time all winter. There is not now, nor has there been at any time any case of small pox about the institution since its first appearance. All reports to the contrary are based on malice, etc. I do not know of any new cases and am inclined to believe it is headed off. Some parties seem to be anxious to have it spread. Measles in and around the village, but light so far."

March 3d. Dr. White reports another probable case of Varioloid in Dibble family in town, and another suspected case at the end of town. No exposure except to a case declared by Dr. Holden, health officer of Union to be chicken pox.

March 4th. Dr. White telegraphs: "Come down immediately and decide disputed case."

March 5th, (Sunday). The Secretary went down on night train.

March 6th. The Secretary met village board of Hokah and Health Officers White, Train and Holden. He telegraphed the health boards of Brownsville and Houston to send representatives to Hokah. Both replied, "can't come." He found a lack of co-operation and mutual confidence which was very unpleasant. Had the law permitted him to have done so he would have assumed entire charge of the cases outside Hokah village, but it did not. The suspected case referred to by Dr. White was diagnosed to be Varioloid, and Dr. White's opinion and action approved.

March 18th. Dr. White reports "the last quarantine raised and disinfection performed in Hokah village. That the same had been done in Union and La Crescent last week. Probably the last of the outbreak."

March 23d. Dr. Holden, Health Officer of Union, reports having had eleven cases and three deaths in one family, and they are now disinfected and discharged. Twenty cases in all this winter in Union and Hokah villages and La Crescent. All well.

March 25th. Dr. White reports more cases as occurring over the river in Hokah township. "Dr. Train went over and found three cases in one house; one just recovered. They claim to have

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gotten the disease of Engster (the family who had it before), indicating that disinfection had not been thorough there. I think no great pains taken to prevent contagion up to Dr. Train's visit."

March 27th. Dr. Train reports: "Yours of 26th received. I have been sick. My term as Health Officer, (yearly appointment), had expired, and I supposed I was released. On the evening of 23d I heard of a case of small pox in our town. The chairman of town board said that no one had been appointed in my stead, but to go and see to it; and the board would appoint a Health Officer next day, which they did, and relieved me, whose duty I believed to report the case to you. However, I went and saw the case. Found a child nearly well, it being the eleventh day of the eruption of small pox. Two more sick and probably Variola, but not yet broken out. The three sick had not been vaccinated; all the rest had been, in Germany. I have been confined to bed since. Write to Health Officer for further details." (The doctor did not give the name of his successor. H.)

March 30th. Secretary telegraphed to local board of health: "How many cases of small pox have you? What are you doing about them? Telegraph and write."

March 31st. Dr. Holden, Health Officer, wrote: "There is one family, four miles from town, of which three have the small pox; so reported by Dr. Train. I am Health Officer; shall see them to-day. The river has been so high that it has been almost impossible to go to them, but they are quarantined."

April 4th. Dr. Holden reports: "Five children in one family with small pox, some of them well." From this family no more cases were occasioned, and the disease disappeared from Houston county.

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WASHINGTON COUNTY.

STILLWATER.

First notice of outbreak, Nov. 14th, 1881.

Number of cases Variola	2
" " Varioloid	1
Total	3
Number of deaths	3

Date of last report, December 2d, 1881.

TOWNSHIP OF DENMARK.

First notice of outbreak, Nov. 18th, 1881.

Number of cases	7
" deaths	1

Date of last report, Oct. 10th, 1881.

REPORTS IN DETAIL.

STILLWATER.

Nov. 14th, 1881. Health Officer, Dr. T. C. Clark, reports a case of small pox, a boy (unvaccinated) thirteen years old, whose parents live at Race Track, 1½ miles from town. Came home from Fargo, D. T., two weeks ago. Had been working on a farm near that place. The family is isolated and quarantined, and vaccination is general throughout city.

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Nov. 27th. The first case died on seventh day of violent confluent small pox. The mother and other child, 2½ years old, vaccinated immediately when the first case was seen. At this date mother and child are sick. Disease much modified by vaccination in mother, but not in child, upon whom vaccination had not sufficiently advanced when taken sick. The cases being county charge, were turned over to the county physician, who after one visit refused to go again, and so the Health Officer (Dr. Clark) took charge. Vaccination made pre-requisite to admission to public and other schools, and compulsory in State Prison.

Dec. 2d. Two more deaths in infected family; no other cases.

TOWN OF DENMARK.

Nov. 18th, 1881. Dr. A. Young, of Prescott, Wis.. kindly called the attention of the Secretary of the State Board of Health to the occurence of small pox in one family in Denmark.

Sep. 28th. A Swede laborer (on the railway building from Stillwater to Hastings) brought the disease from Chicago. He was brought to Hastings for treatment, and his disease being recognized, he was put in pest house till recovered, by Dr. Heitz, Health Officer.

October 10th. Dr. Heitz was called to a family on this railway, and found that the oldest son brought the disease to the family, dying before the case was seen by a physician or recognized. Five other cases happened in that family. Quarantined, vaccinated, and no more cases.

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OLMSTED COUNTY.

ROCHESTER.

First notice of outbreak, Nov. 19th, 1881.

Number cases of Variola	1
" " Varioloid	1
Total	2
Number of deaths	1

Date of last report, December 2d, 1881.

DETAILED REPORTS.

ROCHESTER.

Nov. 19th, 1881. Secretary State Board of Health noticed telegram in daily paper of small pox in Rochester. Telegraphed to local board. Reply: "One case Varioloid; came from the west. House just outside city limits. No action by the Health Officers."

Nov. 21st. Secretary wrote, calling attention to the fact that the charter of Rochester gives the board of health control three miles outside city limits as respects infectious diseases, and urging immediate action, vaccination of school children, &c.

Nov. 24th. Mr. Gould, Recorder of the local board, replies: "Case isolated; family vaccinated; others in family down with the disease."

Dec. 2d. Mr. Gould reports one case, infected by the first one, dead, and immediately buried. School children all vaccinated. No opposition to vaccination. No further extension of disease.

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YELLOW MEDICINE COUNTY.

GRANITE FALLS.

Disease appeared in November, 1881.

Number of cases 29

Number of deaths 5

Date of last report, Jan. 28, 1882.

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BIG STONE COUNTY.

Case reported Jan. 11th, 1882.
Number cases..... 1
Date of last report, Jan. 29th, 1882.

Small Pox in and near Granite Falls, Yellow Medicine Co., Minn., and in Ortonville, Big Stone County.

No detailed account of the outbreak has ever been received by the State Board of Health. As nearly as can be discovered from the correspondence on the subject, the following are the facts.

The outbreak occurred during the absence of the Secretary from the State. Some time early in November, 1881, a Norwegian girl from Chicago stopped over night at a hotel in Granite Falls. Dr. Stratton, Health Officer, states that she had Varioloid, though no physician saw her. All reports unite in dating the outbreak from the time of her arrival. In due time the hotel keeper came down with Varioloid. His barkeeper went home to Wisconsin and died of small pox.

Dec. 4th. Dr. Stratton reports people negligent of vaccination and careless, and requests that Drs. Hand and Hewitt come up and organize the work. Nine cases of Variola and six cases of Varioloid in the village, all strictly quarantined. About this date the local Board of Health had closed the elevators as against infection from cases outside the town.

Dec. 30th. R. R. Hotchkiss, chairman of the local Board of

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Health, reports to the Secretary of State Board of Health: "Yours of late date at hand. We have the small pox under control. There are but two families afflicted with the disease. In one there have been seven cases and three deaths. In the other three cases and one death, in the hotel on the east side of the river. In the hotel, besides the proprietor and his bartender, there was another man who went to Big Stone City, and died, and three others, removed to a pest house, are getting better. Five families in the country—one seven miles north (Knudson's) had one case; another four miles west of Knudson's had ten cases; another family near by five cases—all doing well. One family in Stony Run township, nine miles west of Granite Falls, had five cases, all doing well. Every one in town has been vaccinated and schools closed since November; opened Jan. 2d, 1882.

No other reports, except later one, that all traces of the disease had disappeared.

Dec. 4th, 1881. Dr. Murphy writes that the disease is at Big Stone City, D. T. (as noted above) and expects it in Ortonville.

Jan. 11th, 1882. Case reported in Ortonville, a saloon keeper.

Jan. 29th. Dr. Lane, health officer, reports the case convalescent, and no more cases.

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COTTONWOOD COUNTY.

WINDOM

First notice of outbreak, Dec. 11th, 1881.

Cases of Varioloid..... 2

Date of last report, Jan. 2d, 1882.

Dec. 11th, 1881. Dr. J. H. Tilford, of Windom, reports case of Varioloid.

Dec. 28th. Upon request of the Secretary, Dr. Tilford reports: "The case came to Windom from Mountain Lake, this county, December 10th. He was sent half mile from town to a family who had had small pox. December 24th, convalescent, he was returned to Mountain Lake. A few days ago another case, probably exposed to first case. He had been vaccinated a few days before sickness, and is doing well. The eruption on body confluent, on limbs discrete, but rapidly suppurating and already scabbing (aborted Variola).

A health board organized, Dr. Tilford Health Officer. Persons and places suspected, quarantined. The doctor reports ten cases, who, after vaccination with bovine virus began to take effect, were sick at stomach, had headache, and four very sick and had well defined rash. No pustulation; asks for advice.

Dec. 30. Secretary replied: Roseolous rash not infrequent after animal vaccination, and is often popalar. When in doubt you are right to quarantine. It is distinguishable by its speedy progress to maturity.

Jan. 2, 1882 .Dr. Tilford replies the second case still quarantined. The vaccination rash disappeared after 24 hours. Vaccination general. No further cases of disease.

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RENVILLE COUNTY.

HECTOR.

First notice of outbreak, Dec. 12th, 1881.

Number of cases..... 8

Number of deaths..... 2

Date of last report, Jan. 11th, 1882.

Dec. 12th, 1881. A man I. B. K., exposed to Variola at Big Stone City, D, T., returned from there to his family. Said family occupied a tenement house in common with two other families and the primary department of the public school. The man took sick. His disease was recognized. Local Board of Health organized. Dr. O. P. Breunsholtz appointed Health Officer. Board removed the school, ordered out the two other families, placed K's family under quarantine and reported by telegraph to State Board of Health. Also quarantined trains as against infected district west.

Dec. 19th, 1881. K. broke out with small pox. He and family were removed one mile south of the village to an unoccupied house taken as a pest house.

Dec. 24th, 1881. K. died. Buried on premises with bedding, etc. Every precaution taken. The tenement house in town fumigated and closed. One other house of two families quarantined.

Jan. 2d, 1882. Reports four more cases, wife and three children. They have a male and female nurse. No more cases.

Jan. 2d, 1882. Two more cases in same family; at pest house. Quarantine in village raised.

Jan. 11th, 1882. Baby four months old died last night, others doing well. No further cases reported.

Oct. 6th, 1882. A complaint to the State Board against the lo-

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cal Board of Health for not affording proper compensation for the use of house taken as pest house. Copies of the laws relating to the matter forwarded to complainant, with the information that the State Board of Health have no jurisdiction in the pecuniary dealings of local Boards of Health.

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BLUE EARTH COUNTY.

TOWNSHIPS OF STERLING AND LE ROY.

First notice of outbreak, Dec. 28th, 1881.

Number of cases of Variola..... 1

Number of cases of Varioloid... 1

Total 2

Date of last report, Jan. 13th, 1882.

Dec. 28th, 1881. Dr. E. J. Davis of Mankato, member of State Board of Health, visited with Dr. Bishop of Mapleton, a family suffering from Varioloid. "Found one case convalescent, the other beautifully broken out with Variola modified by vaccination. Both boys. The oldest had been a section hand on railroad, and came home fifteen days before. The family consists of father and mother, vaccinated, and the two young men. The famliy are quarantined by local Board. Informed adjoining physicians, and notified the Secretary of the State Board."

Jan. 13th, 1882. No new cases. These probably the last. At same date Dr. Davis reports a slight case of Variolid in wood chopper's camp near Eagle Lake, Blue Earth Co. Camp vaccinated and quarantined. No more cases.

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FREEBORN COUNTY.

ALBERT LEA.

First notice of outbreak, Dec. 29th. 1881.

Five cases Varioloid.

Date of last report, Feb. 12th, 1882.

Dec. 29, 1882. Telegram from A. M. Burnham, M. D., Health Officer: "One case Varioloid, laundry girl, at Hall house.

Jan. 13th 1882. In answer to a letter of the Secretary State Board of Health, Dr. Burnham writes: "Have three cases of Varioloid, mild. They are in charge of the Health Officer and quarantined. Within the city thorough vaccination and re-vaccination. In the country only, as the spirit is moved by fear, I have vaccinated over four hundred, and other physicians in proportion, and we are still at it. The schools will all be vaccinated within thirty days. We have a pest house. Have published the orders of the State and local boards."

Jan. 16th. No new cases since 10 days ago. School board has ordered vaccination of pupils not yet attended to.

Feb. 12th. No cases in city or county, save one in pest house. We have had five cases in all, one an employee of another hotel, (the Bunker House). All cases here have been exposed to travelers stopping at our best hotels.

Total expense, pest house, bedding and all other items will not not exceed $1,000 for the five cases, and the pest house and bedding remain.

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NOTICE PUBLISHED BY THE LOCAL BOARD OF HEALTH.

"Owing to the prevalence of small pox in various parts of Minnesota, the State Board of Health has sent out a circular to the local Boards of Health, making suggestions as to what should be done to prevent the spread of the disease. We make some extracts from the circular to which the attention of our citizens is respectfully invited:

"Let your Health Officer (a physician) immediately examine every pupil in your public schools personally, in this way: Let each teacher call her pupils by roll, and let the doctor examine each child's evidence of vaccination. His rule should be:

To insist on vaccination of all who have not been successfully vaccinated.

To insist upon re-vaccination of all not successfully vaccinated since the tenth year.

In all cases of doubt re-vaccinate.

Instruct all who require the operation, to have it done by the family physician within a brief specified time; after which, provide for its performance by the Health Officer.

Exclude all children from the schools whose parents refuse vaccination, or re-vaccination, when found necessary, as above provided.

Urge vaccination and re-vaccination upon all the population, the rules being the same as for school children.

In accordance with these suggestions the Board of Health of Albert Lea have caused the following circular to be issued:

SMALL POX NOTICE.

Protect yourself, wives, children, and the public generally, by at once vaccinating, small pox having appeared in different parts of our state and Iowa. To check its spread among us I am ordered by the State Board of Health; also advised by the city council and board of education, to urge and recommend immediate vaccination and re-vaccination of all old and young, that have not been so vaccinated within the past ten years. I hope and expect the heads

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of families, teachers of schools, and all other prominent citizens throughout the city and county, to recommend and encourage vaccination by at least being themselves vaccinated. Call upon your family physician, if you have one, if not, upon some other, as all physicians are prepared with pure, fresh unhumanized and humanized vaccine virus, and will vaccinate all who apply. YOU apply at once. Don't wait for a second invitation.

A. M. BURNHAM, M. D.,
Health Officer."

ALBERT LEA, MINN., DEC. 12th, 1881.

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WILKIN COUNTY.

M'CAULEYVILLE.

Disease appeared in December, 1881.

Number of cases.....25

Number of deaths 16

Small Pox at McCauleyville, Wilkin Co., Minn., in December, 1881.—Report by the Health Officer, Dr. F. R. Burnham.

In the absence of the secretary in attendance on the meeting of the American Public Health Association at Savannah, Georgia, from Nov. 25th to Dec. 24th, 1881, Dr. D. W. Hand, the President of the State Board of Health, acted in his stead as executive officer. It was during this time that the outbreak occurred at McCauleyville. The following report of the health officer, Dr. Burnham, exhibits thoroughly good work and pays a proper tribute to the local Board of Health, who so constantly and efficiently seconded the Health Officer's efforts.

REPORT OF THE SMALLPOX EPIDEMIC AT M'CAULEYVILLE, MINN., DEC. 1881.

To Dr. Hewitt, Secretary of the State Board of Health.

At the request of Dr. Hand, I went to McCauleyvilie Nov. 27th, to take charge of the smallpox epidemic that had broken out in that town. On my arrival, I found the people greatly ex-

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cited. Dr. Nichols of Wahpeton, Dakota, had been there and told them what the disease was, but could not leave his own business to help them. An irregular practitioner from Breckenridge had been there the day before I arrived, but was more afraid of the disease than the people themselves, consequently he did more harm than good. Immediately on reaching the village I got the local Board of Health together. I found them very efficient men. They had already done all they could by means of quarantine to prevent the further spread of the disease. A small stream runs through the town just north of the village. The disease broke out in a family on the prairie, two miles north of the stream and did not get into the village. The Board of Health had stretched a cable chain across the north end of the bridge that crosses the creek near the village, and put a guard on the bridge to prevent any one crossing from the infected district. Had it not been for this prompt and decided action on the part of the Board of Health, the disease would have spread much further. From first to last, the Board of Health aided me in every way possible, and to their earnest efforts much credit is due. I speak somewhat at length on this point, for I wish you to know of how much value this local board, acting under the authority of the State, was to this community, and by this example to show the importance of such a board in every town in the State. A better hot bed for the propagation of small pox than this community could not be found. Many of the people were ignorant, dirty, lazy, superstitious; large families were crowded into small houses of one or two rooms. A few of the oldest were vaccinated, and all more or less prejudiced against it. I first vaccinated all in the infected district, and as fast as possible all in the township. The disease was brought to McCauleyville by a young man, who for the past two months had been traveling about from one village to another, frequenting those places where such a disease is always to be found, if it is in a village. He had been in Moorhead, Fargo, Colfax, Waverly and Breckenridge, but had not been at Spring Hill, as was reported. Just where he contracted the disease it is impossible to find out.

Two were dead when I arrived and seven more sick with confluent small pox, all in two houses. On visiting the first house I was told that my services were not wanted, but that I might come in. I found five sick in two small rooms, two in one bed. Quilts were hung up at the windows; not a breath of air that could be kept out got in; not a piece of clothing about the beds or persons of the sick, had been changed, no disinfectants were used, a good hot fire kept the rooms at furnace heat. I need not add that the stench in the house was indescribable.

It was two weeks before I could get the quilts away from the windows, the clothing on the beds and patients changed, and the rooms in good condition. By that time five more were dead. The disease presented itself in such a virulent form—all but two of the cases being confluent—that I found it hard to convince the people that it was small pox. A few of the old peo-

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ple had seen small pox before—probably in a mild form—and could not believe this was the same. It was a malignant form of the disease that we rarely see since vaccination became universal. It resembled very closely the description of *Variolæ Nigræ* by some of the older writers, the exterior of the bodies actually turning black before life was extinct.

In one family of five children all were dead in a week from the time the first was taken sick; two of them died before the eruption appeared. Large effusions of blood appeared under the conjunctiva, and livid spots on different parts of the body. Severe and continued hemorrhage from the nose, and most intense pain in the back characterized these cases. In all there were twenty-five cases and eighteen deaths. Two of the number should not be included, as they were premature births. My treatment, as soon as they would accept it, was thorough disinfection by fresh air and sunlight and the ordinary disinfectants; thorough cleanliness, frequent changes of clothing on the beds and patients. As soon as the first symptoms appeared I gave a comp. cathartic pill, and followed it by Epsom salts or Seidlitz powder, as was necessary. Gave good nourishment in liquid form. For the itching I had the whole body frequently anointed with vasaline, in which was incorporated a little salicilic acid. Most of the deaths occurred early in the epidemic, before proper treatment was adopted, the disease seemed to modify very much after they followed my directions. My deductions from this epidemic are (1) That vaccination and re-vaccination afford the only way of stopping the spread of small pox. Quarantine is very important, and should be enforced as far as possible; but in a scattered and ignorant community like that at McCauleyville, it is impossible to keep the people from running about more or less among themselves. As soon as a community is thoroughly vaccinated an epidemic must stop, for it has nothing to live on. (2) That vaccination and re-vaccination do entirely protect. This epidemic furnished strong evidence to that effect. Every person that had even the poorest vaccination scar recovered if they took the disease, and four at least who were constantly exposed to it did not take it. In that community were two families situated within a few rods of each other, in one family there were four children and the other five. The mother of the former was taken sick with the most virulent form of small pox, and died in three days. Her children were with her all of the time, some of them sleeping in the same bed. I vaccinated them the day of their mother's death, all of the vaccinations took, and not one of the children showed the first symptoms of small pox. The children in the other family were exposed to the same case, only not as much. I vaccinated them, but it did not take, and they were all dead in a week. I mentioned these cases in the former part of this report as being of a very malignant type. (3) That every family and every individual in the State should be examined once a year, or once in two years, and if not showing two good vaccination scars should be immediately vaccinated. If this was thoroughly enforced throughout the State,

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we should have no further trouble from small pox. I think this is a very important point in this State where the births and immigration are so rapidly increasing the population. I prefer humanized virus, because I have so much better success with it, and do not think there is much danger if the virus is properly taken. Arm to arm vaccination is the best. Since making this report I have heard of one more death from small pox at McCauleyville. About two months after all of the cases had got well, a man from Breckenridge bought one of the houses at McCauleyville that had had small pox in it during the epidemic, and moved his family into it. His wife being pregnant at the time the small pox was in Breckenridge, was allowed by her physician to remain unvaccinated; although the house that she moved into had been well fumigated, she took the disease and died, her husband being protected by vaccination, did not take it, and as the whole community were vaccinated, no more cases broke out. It seems impossible that any man who has had experience with small pox can doubt the protection offered by vaccination. I do not think it safe to dilute vaccine virus with glycerine. I tried it with my first cases at McCauleyville, and nearly every case failed to take. It was very unfortunate, for if my first vaccinations had taken, several lives would have been saved.

F. R. BURNHAM,
ST. PAUL.

ST. PAUL, MINN., April 27, 1882.

C. N. Hewitt M. D., Secretary, Red Wing, Minn.

DEAR DOCTOR: Your letter of the 3d inst. was received and I am sorry that I could not answer it sooner, but I had to send to McCauleyville to get a part of the statistics you desired. I have read Dr. Capehart's report, and think it possible that the epidemic in Ransom county, D. T., spread from Richland county, D. T., and I know that there were cases in Richland county, D. T., near Fort Abercrombie, directly traceable to McCauleyville, Minn. In the vicinity of McCauleyville on the Minnesota side of the river and Fort Abercrombie on the Dakota side the families are all related by marriage, and it was impossible to keep them from going back and forth occasionally. The first case in McCauleyville was taken sick about the 6th of November, 1881; there were nineteen deaths in all, twelve females and seven males. Seven recoveries; five females and two males, nationality French. I saw one case in Breckenridge that I pronounced varioloid. He was quarantined immediately and all in the village vaccinated, and no more cases to my knowledge occurred there. He was supposed to have taken it from some one on the railroad.

Yours Truly,
F. R. BURNHAM,
ST. PAUL.

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SMALL POX IN SOUTHERN DAKOTA.

By H. Capehart, M. D., Health Officer in charge.

FARGO, D. T., Feb. 3, 1882.

To the Honorable Board of Health, State of Minnesota,

GENTLEMEN: It has been represented to me by Dr. John Kurtz, (Health Officer), of the city of Moorhead, Minn., that you had requested of him a report concerning the existence of small pox, and spread of the contagion in western Minnesota and eastern Dakota. Which report he (Dr. Kurtz) requested me to make to your Honorable Board.

At the present writing there are no cases of the disease in Fargo or Moorhead. In the month of November, 1881, there were two mild cases of Varioloid and one of small pox, father, mother and child, were discovered at the Continental Hotel, Fargo. They were removed to a small pox hospital and cared for; all three recovered. The hotel was thoroughly disinfected, the occupants vaccinated, and we do not know of any other cases originating from these.

January 12, 1882, the commissioners of Cass county, D. T., authorized me as a special inspector to proceed to Ransom county, D. T., to the vicinity of Oweigo P. O., where the existence of small pox was reported, to investigate the extent of the pestilence there, and to take such measures as in my judgment were necessary for the relief of the sufferers, and to prevent the further spread of the contagion.

I found within an area of four miles, seven cases of small pox domiciled in three houses. Three at Anderson's, three at Knutson's and one at Oleson's. There were, five of them "discrete," but of severe type, and two young men, Knutsens, malignant. Both died during the stage of invasion, were greatly swollen, cyanotic and comatose. The other five cases are now reported convalescing. I vaccinated all in that neighborhood. And the commissioners of Ransom county, acting upon my recommendation, will build a hospital near Oweigo, and take possession of a vacant claim shanty and fit it for the physicians' quarters and quarantine the convalescents and infected persons whilst their houses are being

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disinfected and fumigated. The commissioners of Ransom will provide these people with new clothing and bedding to replace that which is necessary to be destroyed. In this region the most of the sufferers are not able to make the sacrifice of clothing and bedding and supply its place with new at their own expense. Hence if we would get rid of the contagion it must be done at the public expense; and where this is not done, these houses and persons remain a source of contagion for an indefinite period.

The history of this infection is the following: A Mr. Lund is supposed to have carried the contagion on his clothing from the vicinity of Breckenridge or McCauleyville, Minn., to his home near Oweigo. His child took small pox and died. The Knutson family assisted during the sickness and at the funeral and took it, as also the Andersons. Oleson caught it from Knutsons. During the holidays there was a Norwegian wedding in that neighborhood. The groom had small pox eruption on him at the time of his marriage. There were present a large number of guests, affording ample opportunity for its spread. Several cases have occurred that were fairly traceable to said wedding convocation. It is reported that the groom and bride were both taken down with the disease, also the father of the groom, the minister who married them, one of his pupils and his housekeeper. The family of this pupil live near Walcott, Richland county, Dakota, and were all (seven in number) taken with it, and it is reported that the father died of it, and also two of the children.

It is reported that in the region called Wild Rice, in Richland county, D. T., there are quite a large number of cases of it. This is a French settlement. It will likely spread from these infected places. We cannot segregate where large families are huddled in one apartment nor quarantine where it is so widely scattered. In this connection I would most respectfully inquire whether the state or county authorities of Minnesota have taken measures to disinfect the premises of McCauleyville, Minn. Our present cases are traceable to that locality.

Very respectfully, etc.,

DR. H. CAPEHART.

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McLEOD COUNTY.

RICH VALLEY TOWNSHIP.

First notice of outbreak, Feb. 13th, 1882.

Number of cases of Variola..... 1
Number of cases of Varioloid..... 2

Total..... 3

Date of last report, Feb. 19th, 1882.

Feb. 13th, 1882. Mr. W. D. Brownell, reports to the State Board of Health a case of small pox in his vicinity. No one taking action in the matter. Neighbors of the afflicted are visiting Hutchinson every day.

Feb. 14th. Dr. G. Graves, Glencoe, telegraphs to State Board of Health: "One bad case of small pox in this county among the Bohemians, several other cases reported. Local authorities taking no steps to stop it. What can we do? Send vaccine virus."

Feb. 17th. Dr. Graves writes: "We have had in this county two cases of small pox, and one of Varioloid (light), and the other Variola. They are brothers, Bohemians, living in the Bohemian settlement.

The Variola appeared two days after the Varioloid. Have not been out of county for months, and have no idea when exposed. The Variola case was treating and brought two days after the fever came on, and two days after eruption appeared, which was on the 7th February. Had hard time to get local board to act, but now have the house well quarantined. Yesterday I vaccinated most all the children in the district; we are now awaiting for the developments." The doctor had acted under the instructions of the State Board.

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Feb. 19th. Dr. Kee Wakefield, of Worthington, gives further details. The school teacher's brother's wife had an eruption called Chicken Pox, about Dec. 25th, then her husband had it, and then his brother the teacher. Visiting the district affected, Dr. Wakefield offered vaccination to all who could not pay for it, gratis. The disease disappeared after the third case as above.

WINONA COUNTY.

WINONA.

Notice of disease Feb. 21st, 1882.

One case Varioloid.

Feb. 21st, 1882. Case of Varioloid in railway employe. He was taken to small pox hospital, the family where he boarded vaccinated, also the railway employes. He recovered. No further trouble. Origin of disease not traceable. He came from New Ulm a week before the attack.

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LeSUEUR COUNTY.

MONTGOMERY.

First notice of outbreak, Apr. 8th, 1882.

Number of cases of Variola..... 8
Number of cases of Varioloid..... 2

Total..... 10
Number of deaths..... 3

Date of last report, June 5th, 1882.

April 8th. Local Board Health telegraphed Secretary: "Small pox. Send virus to vaccinate 600. Answer." Secretary telegraphed Dr. W. H. Leonard, member State Board of Health: "Variola reported at Montgomery; go down and take 100 points virus" He went down promptly and reported one case variola four miles out of town, ten days standing. Authorities have quarantined it. Dr. Hammond retired from practice; will watch and report. I supplied the 100 points fresh for Griffin."

April 12th. Dr. Hammond acknowledges receipt of letter for Secretary and replies for Town Board. "Dr. Leonard came and left 100 points vaccine. The patient died yesterday morning. No more cases reported. We anticipate an epidemic outbreak, if so will need one or more physicians from abroad to enforce quarantine, etc. Have vaccinated personally 200 and more with it; hope for more virus to-night. The village council pay for virus and I use it free. Will advise by telegraph should we need outside assistance. No competent physician here."

April 10th. Secretary wrote to local Board for details.

April 13th. Secretary wrote to Dr. Hammond: "Have telegraphed you to telegraph to Dr. Griffin, Fond du Lac, for fresh

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virus. Use eight-day humanized lymph as soon as you can get it. Report history of the case, and steps taken to disinfect houses, &c."

April 14th. Secretary telegraphed to Town Clerk: "Remove immigrant baggage to infected house and disinfect baggage room." This in reply to following report of the local Board of Health, made by his request (April 10).

"One Smith immigrated here from Canada, arriving March 27th, 1882, was infected with small pox. This Board discovered it April 7th, and had a meeting April 8th. They wrote a letter to one Mrs. Gillan, with whom the said Smith was stopping, notifying her and every member of her house to keep confined, hired a nurse for them, and provided for communication between house and town. Smith died April 11th. The Board hired a person to bury him and stay with the family. All are well to date. Mrs. Gillan's family has moved into the granary. The trunks of the said Smith are still at depot. Board of Health are furnishing the family with provisions, and consider the house as a small pox hospital. Notices have been posted in three places warning the public. The nurse is instructed to disinfect the house, &c., as directed by the State Board. The Board are distributing the small pox circulars."

April 18th. Roads so bad that could not move the trunks to the hospital till to-morrow.

April 20. Clerk telegraphs: "Children in infected house down with small pox. Boxes not yet arrived. Ten days ago vaccination was offered to the children, but mother refused it."

Same date Secretary wrote: "Should have vaccinated all in infected house. Keep strict quarantine, and push popular vaccination. Will help in any way."

April 21st. Clerk reports by telegraph: "Seven sick in the family." Secretary telegraphed Dr. Leonard to "procure a physician for Montgomery, leave him there in charge, and to report to me by mail. Town expense." This on receipt of telegraphic request from town clerk.

April 22d. Dr. Leonard telegraphs: "Sent a physician to Montgomery this morning," and Secretary telegraphed to local board:

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"Sent physician to you this morning; arrange with him for expenses and nurse. Will write." Same date board applied for two nurses and vaccine. Secretary ordered 100 points virus sent to them, and notified them to get nurses in Minneapolis. Ordered them to confer all authority on Dr. Brown, and instruct him to report to this board. "Hunt the nurse you report to have escaped. He may carry infection."

Same date wrote to Dr. Brown, Health officer: "Be vaccinated yourself and urge it on every one. Go out to pest house and examine thoroughly. Ordered the vaccination of the exposed persons early, and I hope you may find Varioloid. See that sick are thoroughly secluded, and that they have every care. Get nurses in the town if you can. They are better than the average city nurse. Get eighth day lymph from children and use it, and make at least three good marks. Report the treatment of the cases. Hunt up all reported or suspected cases, and all cases of sickness in the neighborhood. Don't let the disease get away with you. Your pay should be $10.00 a day and expenses, so long as you give entire attention to the matter."

April 23d. Dr. Leonard reports it difficult to get nurses in Minneapolis. Sent virus.

April 23d. Dr. Brown writes: "Arrived late last night; found family in horrible condition, eight persons sick in one room on two beds. The family has been shamefully neglected. An old man had been with them till Monday or Tuesday. No wood since Wednesday except what the old lady cut. Baby is very bad, eruption not far advanced. Child has the appearance of having been starved. The disease is malignant, all will likely die. The old lady alone cares for the sick, and she is nearly frantic."

April 25th. Dr. Hand telegraphs: "Delegation at capitol about small pox. Bad scare; will you go down?" Secretary replied: "Coming on evening train. Delegation meet me and go on," and telegraphed to Local Board: "Will be with you to-morrow." On arriving at Montgomery the Secretary, Dr. Hewitt, found a messenger just in from the pest house, with letters to him and to the Town Board from Dr. Brown. The following

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is the letter: "About four weeks ago a man named Wood came from Canada with his wife, to her mother's, Mrs. Gillan's. He was well on arrival, but soon came down with small pox. A local physician of Montgomery, Dr. Wood, was called, was uncertain as to diagnosis, but believed it some eruptive disease, rubeola scarlatina or variola. At next visit he found a case of confluent small pox, which terminated fatally April 11th (14 days ago). Dr. Wood ordered the family to remain at home, buttwo of the boys followed him to Montgomery. Mrs. Smith lost a child just before leaving Canada, from 'Diphtheria." Of the Gillan family the second girl and oldest boy ran away to St. Paul, April 8th, vaccinated by Dr. Wood. All the remaining children, including the oldest boy, who had returned, came down with Variola, April 13th. They were seven in number: Mrs. Smith and two small girls, and four boys, aged 20, 17, 11 and 1 years. Mrs. Smith and two older boys fully confluent. In the younger ones the disease is milder and the babe Varioloid, and appeared starved, always weakly. The oldest boy was vaccinated on the 8th and came down with Variola on the 13th, gaining nothing by vaccination. Mrs. S——, two months pregnant, miscarried April 20th. The condition is very distressing, only Mrs. Gillan alone to care for the sick. She was worn out with watching and nursing when I arrived. The only help was an old man who wandered away seemingly partially insane. There had been no wood cut since 19th to 28th except by Mrs. G. No one had been near her except the priest and the local board's messenger. For some days they had no proper food; could not swallow solids, and had no milk. I found all, including Mrs. G., lying in two filthy beds in one small room, all air holes stuffed with rags, the stench horrible. She had a little alcohol and gruel. I did what I could in providing medicines, stimulants, food and disinfectants, and in getting firewood Telegraphed for nurses, which have not yet arrived. On the 23d, the girl who went to St. Paul returned. She was ill, and presented the scattered eruption of Varioloid. She came from St. Paul on the 20th to a house a mile or more from home. Not yet much sick and helping in the care of others. On 24th I succeded by the aid of the priest and a neighbor in getting more milk, and the good

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effects are already apparent. The babe will probably die to-night, not so much from Varioloid as from starvation and neglect. One little girl will probably die, too. The rest better. The old man who came to bury Smith remained to help till the 19th, when as above he left. He returned last night. Don't know where he went. May have exposed some. His hands and feet are blistered and swollen very badly. He is unfit to do anything. Mrs. G. is worn out and discouraged not only by her misfortunes, but also by the utter heartlessness and inhumanity of those who should come to her aid. The babe died this afternoon. I rolled it up in a sheet saturated with solution of carbolic acid, placed it on a barrow and wheeled it to the grave which my cook was digging, placed it in the grave and buried it. Virus came yesterday, but no nurses. I know men could be got if they would pay for the service. We are six miles from the village over nearly impassible roads. Only communication by messenger, who goes back and forth with supplies, &c. I wrote to the Town Clerk to come out and consult me with respect to carrying out your instructions, and to bring me a saddle horse, as I spent much time afoot yesterday in the woods vaccinating families exposed by the girl Lucy. The Clerk replied: "He cannot come out and cannot send a horse, as the people do not think you (I) should leave your (my) present residence." So you see your Health Officer is to consider himself in quarantine. The fact is, the ignorant fellows are so badly scared that they are utterly oblivious of everything but their own personal safety. No preparations were made for me. I am here with a young man as cook in a little furnished house, which was deserted and which we broke into. I have had to cut wood for both places, walk long distances through the woods to obtain milk for my starving patients, besides acting as undertaker and grave digger. I write this to show you what sort of people I am serving, and what results may be reasonably expected from treating Variola under such circumstances. I believe all these cases might have been saved with proper treatment and care. Now I shall be greatly surprised if any recover.

April 26th (Wednesday). No material change for the better.

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A few quarts of milk daily, but not one-fourth what we need. Some of those who have new milch cows refuse to sell us milk. The judgment of God ought to descend on such a town. The old man is helpless, the woman does what she can." This letter, and one much stronger in language, addressed to the local Board of Health, were handed to Dr. Hewitt on his arrival in Montgomery. He read them both to the town board at the meeting held on his arrival. He had the greatest difficulty in impressing the board with their duty beyond quarantine. A noble-hearted citizen not a member of the board offered a fresh milch cow for use by Dr. Brown. Dr. Hewitt ordered proper provisions to be bought and loaded into a wagon, which, having borrowed a saddle horse of Dr. Hammond, he escorted out to the pest house, with Dr. Wm. H. Woods for company. On the way Dr. Woods informed him that he saw the first case April 2nd, and notified President of the Town Council of the probability of its being small pox on his return. He asked for instructions. They were: "Tell him to stay at home." April 4th, went again; found unmistakable confluent Variola. Offered to vaccinate the family but they refused. Came back and notified the President of the Council and asked for instructions. Reply: "We'll see you again," which he did not. It was not until the 8th April that telegraphic notice was sent to the Secretary State Board of Health. Dr. Hewitt visited the pest house, seeing the sick through a closed window, where all were visible. Every case well marked. Consulted with Dr. Brown and approved his arrangements, promising to endeavor to get him a saddle horse On their return Dr. Hewitt was arrested by a policeman at the outside of the town on the order of the city council prohibiting any one to enter the town from the pest house. Failing to persuade him the Secretary of the State board of Health begged leave to report to the local Board of Health in arrest. With some difficulty he got them together and very plainly told them the folly and absurdity of their panicky action; whereupon he was graciously permitted to lodge at the hotel till he could take a train. He put before the board their duty now and in the future as to the present

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cases and the liability of an outbreak in town. Ordered to send vaccine to Dr. Brown.

April 28th. Dr. Brown reports no additional cases. Vaccinating all around, but no vaccine has arrived. A little girl six or seven years old died this morning in infected house. A nurse had come in from Minneapolis.

April 30th. "All going well in pest house. Horse came yesterday. Write instructions as to disinfection, etc."

May 1st. All doing well.

May 4th. A case of small pox in the family exposed by the girl Lucy. Nurse went home this morning.

May 6th. New case is doing well. No more.

May 8th. One case only hanging on in Gillan family. Remove new case to pest house to-morrow.

May 12th. All doing well, cook gone. Am doctor, cook and chore boy in one. The new case sickened before vaccine had time to operate, the second day of its use.

May 17th. The Health Officer, Dr. Brown, went into town today to reside till the last cases are recovered.

May 22. No more new cases. This is the sixteenth day since last case came down. Asks instructions as to disinfecting granary used by convalescents, and containing wheat and corn. Reply "Thorough use of sulphurous acid gas and ventilation will do that. Be very careful to destroy or disinfect all bedding, clothing, etc., before leaving."

May 27th. Another case of Varioloid in the pest house. By direction of the Secretary of the State Board of Health, the trunks of the first case were moved to the pest house. Information had been received that there was no small pox in Canada whence he came. The varioloid case is in an elderly woman—who on careful inquiry was found to have been inoculated when a child in Ireland, and upon whom it worked severely then. Dr. Brown had many "sore arms" after the use of animal virus. One instance worthy of note, a boy aged fourteen, vaccinnated with "Griffin" virus, April 30th. He had a very sore arm but felt well enough to work in the field where his sore arm was daily wet. May 19th the parents noticed

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his face swollen. 21st. He was badly bloated. 23d. The doctor called. Patient had no pain, lower limbs œdematous. Abdomen contained much fluid but not enough to obstruct respiration. Pulse 72, urine, no albumen. Sp. gr. 1030. 25th. Dull and inclined to droop. Dropsy disappeared under diuretics and calomel. Has had numerous convulsions since preceding day. Frontal headache and dimness of vision. 26th. Dropsy gone, headache and dimness of vision persisting, pulse 60 and irregular. 27th. Appeared well."

June 5. Last case of small pox discharged; disinfection and fumigation completed; go to Minneapolis this afternoon."

The report made by Dr. Brown at the Sanitary Council in Minneapolis, is worth reading as an illustration of the hardships and difficulties of persons who are so unfortunate as to have small pox in a country district, and also of the labor and self sacrifice required of a health officer, who is "resident physician and health officer" in such cases.

FILLMORE COUNTY.

LANESBORO.

First notice of outbreak, April 13, 1882.

Number cases of Variola	1
" " " Varioloid	1
Total	2

Date of last report May 23, 1882.

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April 13th, 1882. In answer to telegram, Dr. J. C. Hvosleff, Health Officer telegraphs to Secretary: "Emigrants from Norway came on infected ship to Philadelphia, then to Lanesboro. Twelfth day after leaving ship had confluent small pox. I was called and whole family quarantined. How many exposed to date impossible to tell. All in house (5) previously vaccinated. Local Board active. Secretary sends tracts on small pox and disinfections, also laws, and advised getting to the use of humanized virus as speedily as possible, as quicker and more certain.

April 17. Health Officer reports: "The ship arrived at Philadelphia 14 days from Liverpool, March 29. Patients reached Lanesboro April 1st, and taken sick in night between 6–7 April. There was one man sick aboard. Eruption appeared after leaving port. No more cases at date. The house perfectly shut out from rest of town and disinfectants in constant use. I am the only man visiting the sick and change clothing, wash and disinfect myself every visit."

April 21. Case doing well; no others.

April 25. Reports the head of the family in which the case is cared for, down with Variola. Taken sick on 21st. Eruption appeared on 24th. Not bad. First case doing well.

April 25. Petition from citizens that local Board be required to remove the sick from the infected house, which is in a thickly populated portion of the town.

April 28. Secretary enclosed the complaint to the local Board, and notified complainants thereof.

April 28. Health Officer reports first case convalescent and second very mild Varioloid.

May 1st. Health Officer reports: Both cases up and doing well. As to complaint sent to the Board, could not find a suitable house for a pest house when cases first appeared. No attendant to care for it. So that I have myself carried food, water and medicine to the infected family. The complainant was consulted at first but gave no advice. After consultation the Council and Board of Health have decided that now to remove the convalescents would only increase the danger. The Secretary of the State Board had insisted on the immediate vaccination of the family, but the Health Officer believing that the

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family had been infected by exposure to the case before he was called, had followed the advice of his teacher of practice of medicine, Niemeyer, who disapproves vaccination of persons already infected with small pox, and recommends precaution against such a step. He also quotes popular opinion in Lanesboro, that a few years before a small pox patient in that village was vaccinated after exposure to small pox, and his sickness was so much worse than the others not vaccinated, that he died." The Secretary replied: "Am sorry to take issue with Niemeyer, but repeatedly during the last six months we have vaccinated families such as your cases were in, and the vaccine has either prevented the Variola altogether, or converted it into Varioloid. I am utterly at loss to know how you are to judge that this or that person is, at any given time, "infected." But vaccination enables you to *know* whether they are protected, which is our problem in such cases."

May 8th. No new cases. Patients convalescing finely.

May 15th. Same report, and asks for instructions as to discharge of patients, and disinfection of persons and things. Secretary advised: "Burn bedding, mattresses and bedticks and follow printed instructions."

May 23d. No new cases. Am cleaning and disinfecting. Shall discharge the family 24th or 25th.

No further trouble or report.

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HENNEPIN COUNTY.

An Account of Small Pox in Minneapolis from May 4th to December 25th, 1882, by Dr. J. C. Cockburn, Health Officer.

MINNEAPOLIS, MINN. JAN. 3D, 1883.

Dr. Hewitt,

DEAR DOCTOR:—I am somewhat late in getting this in to you but you can imagine how I am crowded for time. I am sorry that I have not time to convene our council committee on ordinance with our board to get at some ideas of the necessary legislation which each might suggest; but as I could not we will have to let it go now. I hope what little I have reported for you may help you in facts as evidence of necessary sanitary legislation.

I am glad to say that at present our small pox outbreak is seemingly controlled. * * * * * *

Yours very truly,
J. C. COCKBURN.

REPORT.

Case 1. On May 4th, Mr. L. M., at 408 First street North, was reported sick with small pox and found in the second or third day of eruption. Patient was removed to hospital and his family and all the inmates of the house (a large boarding house of French) vaccinated, the house fumigated and thoroughly disinfected. No

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other cases occurred in this house. The patient died the 13th. L. M. had moved a family affected with small pox from Crystal Lake town, about half a mile without the city, to quarantine hospital. This family had come direct from Europe two weeks previously and the disease broke out a few days after their arrival. No other was exposed to this family as far as can be learned. No other cases occurred from exposure to them.

Case 2. On May 7th, Mrs. G., at 313 Eighth avenue South was reported sick with small pox, also found in the second or third day of eruption, and seven months pregnant, with symptoms of premature labor. It was deemed unsafe to move her. House was quarantined and all exposed, or known to be exposed, were vaccinated. Unable to trace this to its cause or where contracted. After a severe sickness this woman recovered and two months later gave birth to a healthy child.

Case 3. On May 11th, B., a child 7 years of age, at 1115 Fifth street South, was reported as having modified small pox, and so found. Unable to trace where or when exposed. House quarantined and all vaccinated known to be exposed. Case light. Recovered, and so far as known no new cases originated here.

Case 4. May 19th Mr. G., 313 Eighth avenue South, came down sick twelve days after report of his wife's case (case 2.) Remained at home with his wife and recovered. Both had been vaccinated when children and not since.

Case 5. May 28th Miss J. L., in same house with Mr. and Mrs. G. (cases 2 and 4), came down with Variola. Had endeavored to prevent any communication between the families but evidently had failed. The case was quarantined at home. Died June 5th. Had been vaccinated at time of eruption in Mrs. G.'s (Case 2) but was imperfect.

Case 6. June 1st, at 208 Seventh avenue North, a boarder was taken down with the disease, removed to hospital and same night house was disinfected as well as possible with the family in it. All vaccinated. This patient recovered. Could not trace this to its cause, except that he was living and working in vicinity of case first.

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Case 7. June 6th C., at 812 Spring street N. E., was without doubt exposed to case first. Eruption had been out for about a week. No physician attending, the family trying to keep it hidden. Patient was removed to hospital; mother accompanied him. House shut up and fumigated. General vaccination in neighborhood. Patient recovered.

Case 8. June 9th at same house where case 6 appeared, another boarder was stricken down, this one and the other had slept together the night before No. 6 was removed to hospital. This last was also removed to hospital and died June 21st.

Case 9 appeared June 9th at same house, was removed to hospital and recovered. House again disinfected and no more appeared here.

Case 10. June 10th, Mrs. S. 302 8th st. South, was reported and found to be in the eruptive stage of Variola.

Case 11. June 10th, a child of Mrs. S, in the same condition of Variola as the mother. These were removed to hospital with other child and servant girl. House closed and fumigated; general vaccination. Mrs. S., case 10, died June 21st, and case 11 recovered, was removed from hospital, and subsequently died of diarrhœa; case 10 had been confined three weeks previously and was nursed by a woman who had been taking care of case 2 up to the time of eruption, and having suspicion of what was the trouble, left before the house was quarantined. This nurse was followed up and vaccinated. The vaccination worked but lightly, and at the same time felt considerable constitutional disturbance. This passed off and she felt all right again and at once assumed her nursing of this case (Mrs. S.) in confinement. While nursing, a few sores developed on the body which were not heeded or spoken of to the attending physician, and not till after patient (case 10) was removed to hospital, did the nurse think of her sores. She was examined and unmistakable marks of Varioloid found, the scales having fallen off but a day or so before.

Case 12. June 17th, another who had been exposed to case 7 in the same family, for several days was affected with Varioloid and

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quarantined at home. Recovered. This case had a good vaccination and Varioloid was light.

Case 13. June 19th, E. L. a brother of case 5 became sick, was removed to hospital as soon as eruption showed, and died June 27th. Infected clothing removed to hospital and house disinfected.

Case 14. June 21st. Had been exposed to case 7 boarding on Van Buren st., was taken down with Varioloid, was removed to hospital, house and family quarantined. Case recovered.

Case 15. June 22d. Mr. B., a carpenter, had been building a fence around next house to 313 8th Avenue S. where cases 2, 4, 5 and 13 were quarantined; contracted Varioloid in a mild form. Was removed to hospital and recovered.

Case 16. June 23d, C., another member of the family where cases 7 and 12 occurred, but living in another house, contracted Varioloid, was quarantined at home and recovered.

Case 17, June 23d. Mrs. A. L. Aborted at eight months, child lived but a few moments, was attended by midwife in her labor. Was called to see her next day, found her in high fever and pulse accelerated but no eruption. A physician had been called before and was in attendance, whose opinion was that typhoid fever had caused the abortion. Called next day with attending physician and found a profuse small pox eruption, and the woman died in about two hours later. This case occurred in the same block with cases 2, 4, 5 and 13, and doubtless had exposed herself in passing or meeting others on the back grounds of the house.

Case 18, July 3d. Another member of this last family was attacked and eruption appearing was moved. Other members of the family not feeling well, all were taken to hospital, six in number.

Case 19, July 5th, was another of the same family after moving to hospital.

Case 20, July 6th, was another of the same family after moving to hospital.

Case 21, July 7th, was another of the same family after moving to hospital.

Two of these cases, 19 and 20 died, aged seven and sixteen years;

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the other cases recovered. The father and one boy about eight years old escaped the disease, vaccination having worked promptly. All clothes were taken from the house to the hospital and destroyed. The house was shut up and cleaned.

Case 22, July 8th. R. on Van Buren street, where case 14 occurred. Here some members of the family had the disease before, and those who had not were moved with the patients to the hospital, with all the bedding and clothing exposed or worn by any of the sick. House was fumigated, and the patients from here recovered, and no more cases came to notice, till

Case 23 was reported, Nov. 23d, from Plymouth Ave. and Eighth Street N. On visiting found a patient in third or fourth day of the eruption, confluent, a family of twelve, none of whom had been vaccinated. All were vaccinated now, but one patient died Nov. 28th.

Cases 24, 25, 26, 27 and 28 appeared December 1st, and ten of the family were moved to hospital the same day.

Cases 29, 30, 31 and 32 came right along, and

Case 33, of same family was moved there a day or two later. Result, five more deaths in same family. At this time the remainder are convalescent.

Case 34, Dec. 2d, was reported at 114 Plymouth Ave. A little girl had been sick with Varioloid for three weeks. This fact had been suppressed. No physician had seen the child, till called to see the mother of the child, who was supposed to be suffering from some other disease. The little girl was found in convalescent stage, and two boys with the premonitory symptoms. Whole family of six moved to hospital. Also all the clothing from the house.

Cases 35, 36, 37 and 38 followed in a day or so in this family after going to hospital. All were mild Varioloid; vaccination had been good. All recovering.

Investigation has shown that case 23 had been contracted from case 34, when it was not known by those associating there, the real nature of the disease. The origin of case 34 has not been found so far.

Case 39, Dec. 9th, an infant in the same house with last family

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removed, next came down, and father, mother and child were immediately removed to hospital, and all the clothing of both families removed to hospital to be destroyed or cleaned. House thoroughly fumigated and child now recovering.

Case 40, Dec. 13th, occurred in a lad who had been in the house of the family where cases 34 to 38 had been. On first sign of eruption was removed to hospital. House closed and fumigated, and thoroughly disinfected. Patient now doing well.

Case 41, Dec. 13th. Mr. T. was taken to a general hospital, and in twenty-four hours after showed eruptions of Variola, and was immediately removed to quarantine hospital; patient is now doing well.

Case 42, Dec. 16th. Mr. C., a songster in Theatre Comique, after a few days illness developed Varioloid eruption, and was immediately removed to hospital, and all his clothing and bedding taken away. It is now 17 days since any new cases were reported, and we breath more freely.

On surveying the above cases the first thing to call attention is that immigrants infected were allowed to pass over 1500 miles of country without any quarantine at eastern ports by national authority.

The next is the severity of the disease when vaccination has not been taken, and when re-vaccination has not been done, and the mild and safe character of the disease when vaccination has been successful and re-vaccination kept up.

The next and very important feature is the showing of how inadequate is any attempt to control the spread of the disease by attempt to quarantine patients and their families in their homes. The outbreak beginning with May 4th, continued spreading for 10 weeks, till July 7th, and not till we commenced moving whole families exposed did any control of the disease obtain.

The scourge which came on us so suddenly Nov. 23d, and in ten days had 16 victims prostrated, and in all victimized 28 persons, was got under control in twenty-three days, and here no attempt was made to quarantine at home, but all were taken to hospital as soon as possible, and I have no doubt many lives were saved by

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the prompt removal, preventing more from exposure; and in all cases instant removal should be insisted on.

Early diagnosis is of great importance in preventing the spread of the disease and saving life; where cases have been removed as soon as eruption appeared, and clothing and bedding removed or at once disinfected, no case has been traced back to this, and further spread has been cut short at that point.

To summarize, to prevent the spread of small pox, vaccinate and re-vaccinate; remove every case and all exposed to quarantine hospital; destroy or take great pains and sufficient time in cleaning infected clothing.

Watch closely all doubtful cases and have them removed as soon as eruption appears by which to make a diagnosis.

In this city a case is reported where Varioloid existed, and was kept at home, no one notified of the same, and not until the boy got well and was out on the streets, did any one know anything about it. I thought of prosecuting the father of the young lad, and sought counsel of the City Attorney, who gave it as his opinion, that as no physician had attended the case, and the boy was not left to want or was not neglected, and no report had been made of any lack of care, that under the charter and ordinances of our city no person was punishable, a bad condition for city authorities. What is to prevent any one surreptitiously caring for a case of Varioloid in their own family and spreading it to all citizens? Give us some better legislation on the subject, give Boards of Health power to prosecute in such cases and make the offense criminal and manslaughter.

CRYSTAL LAKE AND MINNEAPOLIS.

First notice of outbreak, April 25th, 1882.

Number of cases of Variola	19
Number of cases of Varioloid	28
Total	46
Number of deaths	14

Last report, Aug. 28, 1882.

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CRYSTAL LAKE.

April 25th. Dr. Cockburn, Health Officer, Minneapolis, telegraphs: "Three cases of Variola at city pest house since Saturday." Answer: "Coming."

April 27th. Returning from Montgomery on this date, the Secretary of the State Board of Health and Dr. Cockburn, went out to investigate origin of cases of small pox in Crystal Lake township. Found infected family in the Minneapolis Small Pox Hospital (which is in Crystal Lake township, just on the line,) said to have been admitted on the order of the local Board of Health of Crystal Lake. We went to see the chairman of that board and found he knew nothing about it, and that the order was a forgery. Secured his order for care and appointing Dr. J. H. Salisbury as Health Officer of the town. On our return found that the family were strangers who had been moved as above from a house vacated, the land being used for procuring clay for bricks. Ordered the deserted house fumigated before entrance by any one.

April 28th. Dr. Cockburn telegraphs: "Owners of infected house, Crystal Lake, forbid the warden fumigating it; threaten violence. Sent warden back with note. Any instructions?" Answer: "I advise disinfection of that house as ordered by chairman of local board. Let health officer insist and you support him." Also advised to prosecute the persons concerned in moving the infected family to the pest house without orders. Dr. Cockburn undertook to attend to the matter.

May 6th. The "dog killer" of the city, who was hired to move the infected family, was discovered hy the Health Officer to-day down with Variola. He was moved to the pest house. He was then doing business as an expressman when hired by a man named Stewart to do this work. His sickness has exposed a large number of others living in the same house. One of the families keeps a large number of boarders, mostly French and men out working. But few were in at the time of discovery. Quarantined them with the family for vaccination and for observation. Kept the rest from returning.

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May 15th. The dog killer Miller dead at pest house and buried same night. One case, 8th av. S. woman pregnant, doing well. Other cases quarantined at house. The friends of Miller talk of prosecuting the men of the brick yard who, they claim, did not inform the dead man of the work he had to do.

May 16th. Secretary wrote Dr. Cockburn urging a writ against the offending parties by the local board of health; and such order was given to the city attorney.

May 28th. Another case on 8th av. Case one reported (15th) recorded and husband down with confluent small pox. A young woman in same house, but in another tenement; taken sick and moved into same quarters as the other cases; fumigated the part she left. The pest house clean at last and the family of Miller clean.

June 1st. In reply to inquiry as to origin of cases, and suggestion that all removable cases be taken to the pest house and *buildings* occupied as tenements be quarantined rather than *rooms*.

Dr. Cockburn replies: Just moved another case to pest house; vaccinated neighborhood and disinfected dwelling. Origin not traceable—possibly from the dog killer (Miller); possibly from clothing as it is three weeks since he was moved. On 8th av. the whole house is quarantined. The first case, a pregnant woman, seven months, is convalescent. (See Dr. Cockburn's report *ante*.)

BLOOMINGTON.

Aug. 1st. Dr. Dunn, health officer of Shakopee, Scott Co., reports small pox at Bloomington. Wrote to Dr. Leonard, Minneapolis, to report. Dr. H. H. Kimball informs him of one case. Addressed the communication to supervisors of the town.

Aug. 4th. Chairman local board of health Bloomington, reports: "Yours of first at hand. There was a case reported such by a physician; on which report we quarantined the house and patient. The patient died and was buried at night. Disinfection thoroughly done. No more cases."

Aug. 28th. Further report on request of secretary. "The doctors decided the case small pox on the 26th of July. The red flag

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was put up the 28th. The husband died the 22d of July; the wife died the 29th of July. The flag was removed Aug. 7th, 1882. No more cases to this date Aug. 28."

St. LOUIS COUNTY.

DULUTH.

First notice of outbreak May 4th, 1882.

Three cases of Variola.

Date of last report May 7th, 1882.

May 4, 1882. Dr. V. Smith, Member State Board of Health, reports three cases of small pox occurring in two families, Germans, who landed at Duluth about two weeks ago from Germany via the lakes. They say they were vaccinated at Castle Garden but it did not take. Local Board removed the cases to the pest house about two miles from town.

May 7th. In reply to inquiry of Secretary, Dr. Smith states as collector of the port of Duluth, he will co-operate in attempt to catch any infectious disease coming in via the lakes, and the Local Board will act as inspectors of immigrants coming. No further report made except that Dr. Smith reported later that no new cases had occurred.

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POLK COUNTY.

POPLAR RIVER TOWNSHIP.

First notice of outbreak, May 11th, 1882.

Number of cases..... 2

Number of deaths..... 1

Date of last report, June 1st, 1882.

May 11th, 1882. Complaint dated May 1st. This day received from Red Lake Falls a case of small pox on Poplar river, 20 miles S. E. of Crookston, in Polk County. (The delay caused by misdirection of the letter.) Secretary answered complainants: "Have requested Dr. John Kurtz to go up and investigate."

May 13th. Dr. Kurz went; (his report missing).

June 1st. Secretary saw the Chairman Board of Supervisors, and upon information obtained of him addressed Dr. Van Dyke, physician in charge of the case, and Dr. C. E. Dampier, of Crookston. The latter gave the following, the only report received. "Up to date two sick and one dead, all in one family. Infection caused by moving the body of a relative, who died last fall of small pox at Grand Forks, D. T. No further details; no spread.

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BECKER COUNTY.

LAKE PARK.

First notice of outbreak, May 15th, 1882.

Number of cases of Variola..... 5

Number of cases of Varioloid..... 8

Total 13

Number of deaths..... 3

Date of last report, Aug. 12th, 1882.

LAKE PARK TOWNSHIP.

May 15th, 1882. Dr. J. H. Carson reports one case Varioloid in Lake Park.

May 29th. Dr. Carson, as Health Officer. "That case of Varioloid recovered. I had him moved into the country, the place shut up and no communication with the house. Last week three other members of the family began to show an eruption, and as the Norwegian physician had declared previous case measles, I called Dr. Kurtz, Health Officer of Moorhead to verify the diagnosis, which he did. The cases are a young man 21, young lady 22 and child 5 years old. We had great difficulty in securing removal of first case. I ask for advice as to law and its execution." Reply: "Local Board have absolute power of quarantine in infectious diseases and to make infected house a hospital. They can remove cases of such disease to another place (if not dangerous to health) and control all infected families till danger is past."

May 30th. Dr. Carson telegraphs: "Come up or send man, as I require help; wrote you yesterday." Answer same date, "Enforce the law. Quarantine sick and infected. Have written you."

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July 30th. Dr. C. writes: "Telegram received. We have now four cases, three in one house, confluent, and one other just breaking out. History is clear: A young man came from Norway to this place, and stopped at the house of one of our merchants, came to me with an eruption, on his body. It was characteristic, and so were other symptoms. I told him he must go where he could be taken care of; he went to Fargo, D. T. The head of the family came down with Variola. I was called and pronounced it small pox, but family physician called it "measles." He was believed. The Norwegian population made much trouble on his removal, but the local Board of Health did it. His child about five came next. John, his clerk, came next. A young lady, sister of his wife, next. Family are now well except boy of 9, who is ailing. Our Board took following steps:

I. Closed the store and permitted no communication with the house.

II. "Vaccinated all who would accept. Put guard on house. The patients are too ill to be moved to pest house. They live in the most thickly settled part of the village. Can we be too rigid, and can we make him bear the expense we incur?" Answered June 1st: "I assume that you vaccinated the family of Mr. Marks as soon as disease was recognized. Sorry the other family could not have been moved out to pest house with first case (no other case there than the one first sent), or to another safe place, until time should show whether they were affected. As the family must now stay at home, use cosmoline freely over skin and scalp, of every one sick. Put all bedding, clothing, towels, etc., in disinfecting solution as soon as used, and do this before washing them. As soon as able remove the sick to the county house, and do it at night if practicable. Use abundant straw in the wagon box and lay straw tick (filled) on that, for the patient; after use burn the loose straw. As soon as all are removed, disinfect house, etc. As to near neighbors, insist on vaccination and re-vaccination, and quarantine them (if in your judgment necessary) till vaccination works well or fourteen pass since last exposure. Use humanized virus as quicker and days surer."

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June 2d. Dr. Carson reports: Only four cases on hand now—three in Marks' house and one at pest house. Mr. Marks convalescent. His child of seven years very sick, as also his clerk and a young lady also sick, all at Marks' house. This young lady's sister is also down, but at pest house. Both the last were exposed in Marks' house before I was called. Both went away, one to Fargo and the other to Crookston, but returned, so that many were exposed by them. Store, and family living over store, quarantined. Will remove them as fast as able to pest house. No new cases. Am vaccinating all I can, and send village police after those who refuse. What shall I do with the goods in Marks' store? He is in and out of store every day for provisions. Shall burn beds and bedding and clothing used by the sick."

June 3d. County Commissioners of Becker county were in session at Detroit and complained by telegraph to the Governor and Secretary State Board of Health: "Have authentic information that several persons in the village of Lake Park are sick with small pox, and the Local Board of Health derelict in their duty and taking no steps to prevent the spread thereof. Asks Secretary to visit the locality and send special instructions to the Board. Business not interrupted, no flag displayed and the matter kept secret." Secretary same date answered: "Under date June 3d, Dr. Carson reports four cases, in one house two, ask to be moved, quarantined and guarded. Vaccination offered to all. Have advised quarantine of all suspected persons. Dr. Carson will answer any questions you may ask him." Same date telegraphed Dr. Smith, member State Board of Health, Duluth, to go to Lake Park, who went there and advised the Local Board.

June 7th. Dr. Smith reports his visit, and that the principal difficulty is the obstinacy of the people, and their unwillingness to believe the disease small pox, till after much exposure.

June 9th. Health Officer reports: "The clerk died and was buried at night. All the rest (3) doing well, and have been removed to pest house. To-day burned all effects exposed to the sick, and am disinfecting the house thoroughly. Shall move family to a house in the

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country till disinfection is complete. What as to goods in the store worth $6,000 to $7,000?

June 11th. Answer of Secretary:

"1st. *As to persons*, seclude those suspected till vaccination or re-vaccination works, or till 14 days have passed since last exposure.

2d. *As to stock of goods*, nothing but what infected persons have handled is likely to be infected. Have floors, counters, scales and other things handled by infected persons washed in disinfecting solution, and then cleaned. Use your own judgment as to details."

June 15th. Dr. Carson reports: "I am busy every day in fumigating the store. Burn about five pounds sulphur a day, and have goods moved from place to place. Has four or five tubs of butter in a small store room off main store. It is well covered. Has been exposed by sick passing, and one slept there. I thought it might be infected, as butter absorbs odors very fast. All doing well. No new cases, and I am confident we have it under control. When can sick return?

June 16th. *Answer of Secretary*: "All suspected should go free after successful use of vaccine or 14 days quarantine. All infected go free after all scabs have come off and skin is well, and after thorough bathing has been had, both using *clothes* new and free of all suspicion."

June 18. All doing well, One of the cases, woman, aborted at five months yesterday; child showed no signs of disease. Mother doing well.

June 24th. No new cases; all discharged. My bill is disputed by County Commissioners, though patients were unable to pay and County Commissioners ordered me to do all that was necessary. They refer me to town Town Board. Answer. "Look to the law. The party first, then town, then county; state last."

Aug. 1st. In a settlement of Swedes, four miles west, are several cases of small pox; one reported dead to-day. It is in one family and they have used every means to keep it quiet. It was three weeks ago; then there were two cases of varioloid, and I conclude

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it is the same trouble. I am unable to act, as that is in the township and belongs to the village board.

Aug. 2d. The local board of health of Winthrop telegraphs secretary that they have employed Dr. Carson as health officer, as suggested by the secretary.

Aug. 4th. Health Officer reports: "Your order at hand. I visited family this morning. It is composed of ten persons; six have had the disease, two have died and at present there is but one case, a child five years old. Find they are isolated thoroughly. Gave full instruction. There is a Swede midwife attending them. No cases outside this family."

Aug. 5th. Secretary wrote: "Look sharp doctor; vaccinate all who will accept, and give me name of pastor whom I will induce to preach vaccination.

Aug. 8th. No new cases. Only one case and he getting along nicely. No one outside the family; gives the pastor's name.

Aug. 12. Took Supervisors to house and instructed them as to quarantine and disinfection. Single patient doing well.

LAKE PARK.

Epidemic of Small Pox during May and June, 1882. Detailed report of Dr. J. H. Carson, Health Officer.

About May 1, 1882, a young man, Hansen by name, arrived in Lake Park from Norway, and stopped at the house of Mr. Marks, a merchant who resided over his store. On May 3d, this young Hansen came to me complaining of not feeling well. Complained of pain in back, fever, chills and headache, and also a few spots on body (papules) and one vesicle behind the ear that was slightly um-

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bilicated. This led me to ask him how long he had been in the country, and where he had been, and found out that he had only been from Norway a few days and that on ship there were four cases of small pox, that he came over on. Told him to come and see me next day not being positive of what it was, but he took fright and went to Fargo by train. Remained there ten days but was not sick nor had he any more spots, nor any medical advice. He had been vaccinated in Norway one year before and it worked well. This case had not more than fifteen or twenty papules and only one vesicle when seen by me.

On May 11th, Mr. Marks sent for me to visit him. He resides in Lake Park over his place of business and the house where Hansen was stopping. I found him with fever, temp. 122, pulse 112, and slight papular eruption on face. I told him he had small pox, and vaccinated the rest of the family except his clerk, John Knudson, who would not be vaccinated. All worked well except with his little girl, aged six years, who took the disease May 24th, and was sent to the pest house where her father was. She had confluent variola, pulse 125 to 130, temp. 104, convalescence slow and had suppuration of left elbow joint, and also a serious attack of inflammation of lungs.

Marks' family consisted of Mr. and Mrs. Marks, three children (aged one year, three years and six years) female servant and John Knudson, the clerk. All were vaccinated and all worked except Marks' daughter and John Knudson who was not vaccinated.

On May 25th John Knudson aged 24 (Marks' clerk) took sick. He had never been vaccinated. Temp. 104 and day of death 108. Pulse 120 to 160. Had the malignant form of small pox. Eruption came out well, was unconscious most of the time and died June 8th.

Miss B——., aged twenty, who had slept in Marks' house after the visit of young Hansen and before Marks took sick, but who had gone to Fargo, took sick with backache, chills, fever and headache. She came to Lake Park to Mark's house, May 26th. She was moved to pest house and had confluent form. Had not been

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vaccinated for eighteen years but had two good cicatrices on arm. Convalescence gradual and made good recovery.

Mrs. B——., aged 20, also had slept in house of Mark between visit of Hansen and Mark's taking sick, but who had gone to Crookston. She did not feel well and came home to her father's to Lake Park, but took her to pest house upon arrival at Lake Park, May 28. Eruption came out well and went through its stages. Had confluent form. Pulse 120; temp. 104, average. She was in family way about five months advanced. She aborted June 6th, of a male child. Made a slow but good recovery. Had not been vaccinated for fifteen years.

Miss Hannah B——., aged 18, also visited Mark's house prior to Mark's taking sick. Had been vaccinated one year before, and had a very mild attack. Made a good recovery.

June 4th. Disease made its appearance in a Swede family four miles west of Lake Park. First case was Miss Nelson, aged 20, who had been at Mark's house. Had mild attack; was vaccinated one year before.

Two children, aged three and five, both had confluent form, and both died, never having been vaccinated.

Three other children, aged seven, nine and thirteen, all had it, but had been vaccinated and had it in mild form.

The family consisted of ten, and all had been vaccinated but the two who died. Strict quarantine was initiated in all cases as soon as found to be small pox. Pest house was got and all placed in that, and then taken and kept in quarantine for two weeks after convalescence. In all these twelve cases all were vaccinated but the three that died, and in my mind their deaths were due to not being vaccinated, and all those who had been vaccinated had it in a much milder form than those who had not been vaccinated.

The origin of the outbreak is plainly due to the bringing of the disease by young Hansen from an infected ship to Mark's, and all the cases can be traced to Mark's house. Some had it who visited there prior to Mark's taking sick with the disease. I am

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a firm advocate of thorough vaccination, as the history of this epidemic will prove. I remain,

Yours truly,

J. H. CARSON, M. D.

LAKE PARK, Jan. 5th, 1883.

RED WOOD COUNTY.

WALNUT GROVE.

First report, May 15th, 1882.

Number cases Variola	1
Number cases Varioloid	2
Total	3
Number of deaths	1

Date of last report, May 30th, 1882.

WALNUT GROVE TOWNSHIP.

May 15th, 1882. Dr. C. M. Ferro, Health Officer of Tracy, notified Dr. E. J. Davis of the State Board of Health, Mankato, of a case small pox at Walnut Grove. Premises quarantined, but whole vicinity exposed. Same date Town Council apply to Dr. Davis to take measures to prevent visiting, also to quarantine persons exposed.

May 16th. On telegram from Dr. Davis, Dr. Hoyt of Walnut Grove, wrote: "One case confluent small pox, 1¼ miles east of town. On appearance of eruption put up the red flag and ordered

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quarantine, but they pay no attention to my order, and refuse to obey town authorities."

May 11th. Secretary heard of the outbreak and telegraphed Dr. Chas. Berry, of New Ulm, to go up. He was delayed by an accident.

May 17th. Dr. Davis notified Secretary and stated his inability to go up.

May 18th. Chairman of local Board telegraphed Secretary: "Man died yesterday. No new cases. Lots of exposures."

May 19th. C. L. Webber, Chairman Board of Health, writes to Secretary: "Dr. Berry not come; we have no physician. Quarantined affected family from town. Any suggestions gratefully heard." Secretary wrote fully the steps to be taken.

May 22d. Mr. Webber reports: "The lady of the house where the man died has been sick about three days. Vaccination did not work with her. Her husband and nursing babe vaccinated at the same time,and both worked well. A young man working for the man who died, after his death, went to his parents where are a large family of children. We have ordered him back, but he will not go. Has doubts as to power of local Board to control him."

May 30th. One death and two cases Varioloid to date, and large family in house where there is a case. No more cases. The cause of the outbreak is explained by local Board as follows: Three men came from Montana in April, bought a buffalo robe near Bismarck, and brought it with them. It was used in other houses before being brought to the house where the disease broke out. The young man in attendance upon the one who died went home to a large family after the death. Parents alone vaccinated. We vaccinated whole family. It took on all but two children. After the young man had been broken out several days (2 to 4) we again vaccinated the two children. It worked well and none took the disease. Your instructions were followed as to quarantine and disinfection with good effect."

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ISANTI COUNTY.

TOWNSHIPS OF MAPLE RIDGE AND STANCHFIELD.

First notice of outbreak May 28, 1882.

Number of cases of Variola	14
" " " " Varioloid	11
Total	25
Number of deaths	7

Date of last report June 8, 1882.

HARRIS (STATION.)

First notice of outbreak Dec. 27, 1882.

Number of cases of Variola	1
" " " " Varioloid	6
Total	7
Number of deaths	1

Date of last report Feb. 3, 1883.

MAPLE RIDGE TOWNSHIP AND STANCHFIELD TOWNSHIP.

May 27, 1882. Reports reached the Secretary that small pox had appeared in Maple Ridge township. He wrote the date to Dr. Whittimore, Health Officer, Elk River, who replied May 30th. "Telegraphed Dr. Gile, of Princeton, practicing in that neighborhood, who answered: "None there; authority, a neighbor and the stage driver. Will inquire further."

June 2. Dr. Whittimore further reports: "The family who were sick live in a portion tributary to Cambridge. The local Board there are satisfied it is a mistake."

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June 4. Dr. N. M. Cook, of Cambridge, writes: "The illness was measles."

Aug. 4. Dr. Cook reports: "I have just visited with Dr. Caldwell, of this village, a family eight miles from this village, near Stanchfield, who have already lost two children and have five more now lying low with confluent small pox. Treated by a quack for one week for water pox, who said it was not contagious." The Secretary replied: "Have written to local Board of Health. Please visit them for me and stir them up. Have requested Dr. V. Smith of the Board to visit this case. Same date wrote to local Board: "If not already done, you will take immediate steps to control the small pox in your town. Appoint a physician health officer. Direct him to follow the laws and directions which I enclose to you. Report immediately the steps you have taken."

Aug. 7th. Telegraphed Dr. V. Smith, Duluth, member of State Board of Health, to go. Replied: "Business prevents." Telegraphed Dr. McComb, Rush City, to go, who went.

Meantime complaints came in from various quarters as to the disease and the neglect of local authorities.

Aug. 11th. Wrote also to Dr. Caldwell, reported in charge of the cases, for details of history and cause.

This date also received Dr. McComb's report: "In town of Stanchfield found in the family of a Mr. Lund (a Swede) five now sick with confluent small pox. Two are dead and three more will probably die. House well isolated and guards in roads to prevent intercourse. The family are well provided for, nurses, eatables, &c., and do not seem at all alarmed, nor do the people in their vicinity. Went to Cambridge to meeting; Council and people organized a local Board of Health.

Aug. 27th. Dr. E. A. Umland, Health Officer Rush City, reports organization of local Board of Health, asking for instructions, &c. Answered, sending laws, circular, &c., and urging a careful watch of the existing outbreak in Stanchfield, of which no further reports have been received.

Nov. 18th. H. F. Baker, member local Board of Health of Cambridge, reports small pox raging again in Stanchfield, very

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fatal, and one died this week after three days' sickness. Asks for an experienced physician who knows small pox when he sees it.

Nov. 21st. Secretary replied: "You have medical men who know the disease when they see it, one of whom must be a member of your Board. Send him to investigate and report. Have written to local Board of Stanchfield and telegraphed to Dr. McComb, Rush City."

Nov. 27th. Dr. Umland, Health Officer Rush City, notified local Board of Cambridge: "The family of Louis Dohlman, east of city of Cambridge, is infected with small pox of the worst type, and am required to quarantine the same."

Nov. 28. Dr. Umland writes Secretary: "Twelve miles east Bush City, town of Cambridge, one family with small pox, worst type. Also reported to be in some families north of same in town of Stanchfield, where the disease prevailed last summer. Have notified neighbors of the fact. Of infected family parents alone vaccinated. Two weeks ago one, a girl twenty years old, died in same house. Last Friday I was called, and saw five more, aged from ten to seventeen years; all stand a very small chance for life. All neighbors and children said to have been vaccinated last summer. Make any suggestions at once."

Nov. 29. Secretary wrote: "Insist that the local Boards of infected towns care for their infected families. Report directly to this Board. See physicians in charge of cases and agree upon some mutual co-operation and report by return mail all the facts you can learn."

Dec. 4th. Nels Lawson, Town Clerk town of Cambridge, reports the outbreak in that town. Letter appended to subsequent report of Dr. Brown.

Dec. 7th. The evident lack of any organization in the management of small pox in Cambridge and Stanchfield, and the necessity for prompt action, induced the Secretary by order of the State Board of Health to commission Dr. E. J. Brown, late the efficient Health Officer of Montgomery, to go to the infected district. The letter of instruction and his report are hereto appended.

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Dec. 13th. Secretary wrote again to local Board of Stanchfield, urging better attendance upon sick and better performance of duty, and enclosed letter to Dr. Umland, Health Officer, to be read and explained to the Board, with further instructions to do his duty fully and fearlessly, despite the ignorance and indifference of the people.

Dec. 14th. Dr. Umland's report of Dec. 12th: "Yesterday two other persons infected. Whole district in quarantine, permitting intercourse among infected families if need be. Will disinfect and fumigate houses which are now free of the disease. More bad exposures daily which I look after promptly. Expect no fatal cases. The greatest difficulty is the belief of the people that it is a sin to oppose what the Lord sends. Nine patients in six houses to date."

Dec. 15th. Dr. Umland reports: "Yours of 14th at hand. Vaccination is working well in infected families, so we may look for an early end of the disease. I begin disinfection with sulphurous acid to-morrow of all buildings from which patients can be moved. Dr. Brown's visit was a great help to us."

Dec. 20th. Dr. Umland reports disinfection very difficult in winter when people have but one room in their house. Local Board assisting now and doing this duty.

Dec. 29th. Secretary wrote to local Board of Cambridge: "See that Dahlman's house, clothing, etc., is thoroughly disinfected, and report that it has been attended to."

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APPENDIX A.

SMALL POX IN ISANTI COUNTY.

Report of Inspection in Townships of Stanchfield and Cambridge, December, 1882, by J. E. Brown, M. D., Health Officer, by Appointment of State Board of Health.

MINNEAPOLIS, MINN., DEC. 7th, 1882.

Dr. E. J. Brown,

MY DEAR DOCTOR:—I am instructed by the State Board of Health to request you to act as the inspector of the Board for the purpose of visiting the towns of Stanchfield and Cambridge, Isanti county. You will go to Rush City, call upon E. A. Umland, M. D., whose card to me, reporting small pox in town of Stanchfield, I herewith transmit.

You will show the doctor this letter of instructions and ask his co-operation in your investigation. The Board request you to visit all infected families in Stanchfield, and meet with the local Board of Health, and advise them as to the measures necessary to be taken in view of what you find to be the necessities of the matter.

Having made yourself fully familiar with the matter in Stanchfield, go on to Cambridge and call upon Nels Lawson, Town Clerk, whose letter is appended. Call also upon Dr. M. M. Cook, whose letter is appended. Consult with them and the local Board of Health, and becoming familiar with the necessities there, advise the local Board as to the best steps to be taken to control the disease. Inform the local Board that if they will guarantee the payment of a nurse, one will be provided for them.

Make it clearly understood that this Board have no authority to pay for nurses or for medical attendant in case of infectious disease; that is the duty of the local Board, Sec. 58, page 4, of laws of Minnesota, copies of which I send you. When your inspection is complete, report to me at Red Wing.

Yours truly,

CHARLES N. HEWITT,
Secretary State Board of Health.

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319 NICOLLET AVENUE,
MINNEAPOLIS, MINN., Dec. 12.

Dr. Charles N. Hewitt, Secretary State Board of Health, Red Wing, Minnesota.

DEAR DOCTOR:—Pursuant to your letter of instructions of Dec. 7th inst. (see appendix A) I have to report the following results of my investigation of the cases of small pox reported by letters of Nels Lawson, Town Clerk of Cambridge, Isanti county, (see appendix B) of Dr. N. M. Cook, of Cambridge, (see appendix C) and of Dr. E. A. Umland, of Rush City, (see appendix D) to exist in the towns of Cambridge and Stanchfield, Isanti county.

I left Minneapolis at 8:30 a. m., Dec. 8th, reached Rush City at noon, where I procured a team, and in company with Dr. E. A. Umland of that place drove to Stanchfield, where I found the following condition of things:

TOWN OF STANCHFIELD.

1. Small pox broke out in July last in the family of Peter Lund, origin unknown. Seven children had the disease, four of whom died. A physician whose name I did not obtain, saw these cases but ceased his attendance before the survivors recovered, and in the way of disinfection gave them something to throw about "which made a great stink." These facts I learned from Miss Carrie Lund, one of Peter Lund's daughters, whom I met elsewhere, nursing. Did not visit the house of Peter Lund, as I was told there was no one there who could speak English, and from want of time. I met Mrs. Lund at a neighbor's (G. N. Peterson's) but she would not be questioned.

2d. The *recent* outbreak began in September. Origin not known, but probably from poison of July outbreak, as I could not learn that there had been either disinfection or quarantine. Ole Fleck and two grand-children were sick; two died. Did not visit this family. Did not learn that there was either medical attendance or disinfection. These facts were obtained from G. N. Peterson.

3d. Present condition (at the time of my visit):

Oliver Medine, suppurative stage; doing well. Wife and daughter have been sick, now well. The other children vaccinated last summer and escaped. Directed strict quarantine.

Oliver Lingren, two boys sick; one of them convalescent, the other at second day. Lingren was away at Union store. I vaccinated the mother and three boys. Left orders that Lingren should stay at home, and quarantine be observed.

Mrs. Elvine—Her brother, Henry Suderland, had Varioloid a week ago. Her two years old child has been sick two days. Vaccinated Mrs. E. and three children. Ordered quarantine.

G. N. Peterson—Child eighteen months old, dead since morning. Head covered with spots from purpura hemorrhagica, having died

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from debility following Variola. Ordered burial as soon as possible. Vaccinated three adults and ordered quarantine.

Sam Olson and his child have been sick one day. I could not talk with them. Both children were vaccinated last summer. Olson was exposed at Medine's. In present outbreak there have been fourteen cases and three deaths in Stanchfield.

All the above families are Swede, and appeared very comfortable as regards general condition, nursing, etc. There had been no medical attendance.

4. The following persons were also exposed besides those previously mentioned: Henry Hanson and wife; John Brackett; Peter Ioline; Hans Erickson; Suderland (of the Town Board) and Louis Loren, the two latter of whom I vaccinated. These had been exposed by Henry Suderland. I also vaccinated Peter Bodell, wife and girl, he having been exposed. Other persons were probably exposed at Rice Lake store, and Union store, in town of Nestle.

5. I saw the Town Clerk, Peterson, Dec. 8th, and requested that a meeting of the Board be called for the following morning, at which time I met clerk Peterson, with Suderland and Ludin of the Supervisors, to whom I made a plain statement of the condition of things, the necessity for action, and their responsibility. They at first were not disposed to act but were speedily convinced of the necessity of doing something. They admitted that they had done nothing to check the disease except to tell the infected people to stay at home. They claimed that they had no money for the purpose of providing medical attendance, etc. I read the law and explained their duties. Dr. E. A. Umland, of Rush city, was elected Health Officer of Stanchfield, and was placed in entire charge of the cases, with the assurance of the full and hearty co-operation of the Town Board. I advised that the entire infected section, extending two miles or more in one direction, be rigidly quarantined and that the most active measures be taken, in the way of vaccination and disinfection, to stop the ravages of the disease. I advised that proper notices and flags should be posted at once and that every infected house (seven in number) be thoroughly cleansed and disinfected with all contents and inmates. I directed that all exposed persons should be vaccinated at once, and ordered for Dr. Umland fifty vaccine points in addition to thirty-five points, some of which latter I used and left the rest with him. I directed that lymph from healthy children should be at once provided for and used when available.

6. An evident unwillingness to give information appeared on the part of many. One woman, at the instigation of her brother, flatly lied about persons having been exposed at her house, but I detected the falsehood and forced her to admit it. These things lead me to suspect I may not have learned of all facts connected with the outbreak. Dr. N. M. Cook, of Cambridge, told me that he had lately received a postal card from Stanchfield, stating that there was no small pox in that town, and signed "Board of Health." Mr. H. R. Grant, of Rush City, told me that he spoke to the Supervisors of Stanchfield some

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weeks since and urged that they attend to the matter of small pox, but was only laughed at.

In town of *Cambridge* I found things to be as follows:

In Louis Dahlman's family six cases and three deaths. His daughter, twenty-two years old, became sick about Nov. 9th, and died the fifth day. Two weeks later four other children became sick, one of whom died Nov. 27th, another Nov. 28th. The others (boys twelve and seventeen years old) are convalescing. A boy eight years old became sick Dec. 5th, and had a rash at our visit, Dec. 9th.

The family was at our visit very comfortable, but had evidently been in a very distressing condition. Mr. Dahlman said they had been left alone by the authorities when they greatly needed help, and now they did not want any aid. I could obtain no information as to the source of infection in this family, but it undoubtedly came from Stanchfield. I vaccinated two persons and directed that one other should be vaccinated.

Miss Carrie Lund, whose four brothers and sisters died in July, at Stanchfield, is nursing at this place, having been employed in the different afflicted families all the fall and winter. She is entitled to great credit.

2d. I could only learn of one person having been exposed here outside the family: Mr. Johnson, a neighbor, whom I directed the Health Officer to vaccinate, as well as his family.

3d. I met the Town Clerk, Nels Lawson, and two members of the Town Board, whose names I did not take, Dec. 9th, and made a statement of facts to them. They had taken no action beyond posting notices at the entrances of Dahlman's place, stating the existence of small pox, and prohibiting all persons from entering the grounds; but they were ready to act, and appointed Dr. N. M. Cook, of Cambridge, their Health Officer, in whose charge the cases and the entire business were placed, with full authority to pursue what course should be deemed necessary. I gave Dr. Cook necessary directions as to the conduct of affairs, vaccination, &c.

4th. Rev. Charles Booth, of Cambridge, informed me that he had urged the Supervisors to take some active steps towards caring for the sick and preventing the spread of the disease, but without avail.

Both the Health Officers appointed, Dr. E. A. Umland, of Rush City, and Dr. N. M. Cook, of Cambridge, desire further instructions from yourself.

Very respectfully yours,

E. J. BROWN, M. D.

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APPENDIX B.

CAMBRIDGE, MINN., Dec. 4th, 1882.

Charles N. Hewitt, Secretary State Board of Health, Red Wing, Minn.

DEAR SIR:—You are hereby informed that the family of Louis Dahlman, of this town, is infected with small pox of the very worst type; everything possible has been done to quarantine the disease. The family is in great need of aid to nurse the sick; it is impossible to procure the same although our Board have done everything in their power to procure the same, as there are none that care to expose themselves or take any chances of getting infected. Any instructions from you as to how to prevent the spread of the disease, etc., will be thankfully received.

I enclose a card from Dr. Umland, of Rush City, which speaks for itself.

Please respond without delay and direct to

NELS LAWSON,
Town Clerk, Town of Cambridge,
Isanti County, Minn.

[By request of Town Board of Health.]

APPENDIX C.

(*Isanti Press, Nov. 30th.*)

NOTICE.

All persons are warned against and forbidden to enter the premises of L. Dahlman of the town of Cambridge, for the reason that *Small Pox* is raging at his house. By order of the town

BOARD OF HEALTH.

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CAMBRIDGE, MINN., DEC. 1st, 1882.

C. N. Hewitt, M. D., Red Wing.

DEAR DOCTOR:—By order of the Town Board of Health I have just visited the place mentioned. It is 4½ miles northeast of this place. It appears that doubt as to the nature of the disease has existed from the fact that Dr. Umland, of Rush City (Dr. McComb being in the east) had been called and diagnosed it *Russian Plague*—Pestis Bubanica—telling the parties that it was "worse than small pox." How true it is I cannot say, but a reliable citizen of Rush City informs me that the Dr. had never attended college and had no experience with Variola. I pronounce it *confluent small pox*, and will back the statement by all I have or expect to have. Two girls have died already, uterine hemorrhage being the finale. The three boys now sick present as many distinct types of the disease, nervous, with rather a dark eruption, malignant with very livid or congested dermis, and natural, or true yellow, and beautiful pustules with comparatively little systemic disturbance.

Will the State take the matter in hand and wish me to attend the cases as they occur, or will it be left to the local Boards? I am the only doctor now in the county. From a young lady who is nursing the cases, a Miss Lund, whose brothers and sisters were the cases reported to you last summer, I learn that at least three other families have had the disease but kept it from being known, and it is doubtful if a time has been that there was not a case since its original outbreak.

If it should fall upon the State to compensate any parties for attendance, this young woman should be first so paid for her faithful services.

Is it my duty as a physician to take the responsibility, visit all places where it is reported, at the expense of the county or State if not called by private parties? People all so indifferent here that we are liable to a terrible siege if decisive steps are not taken.

Respectfully,
N. M. COOK.

RUSH CITY, Dec. 27th, 1882.

Secretary State Board of Health.

DEAR DOCTOR:—In regard to Mary Lund I believe we have been misinformed, as the girl has been home from June 27th till July 23d, the first one in the house who had the disease. But upon close inquiry I find that in the latter part of June, Mrs. Anna Mongsin arrived here from Sweden with three children, one of whom died July 1st, another July 16; the oldest eighten years old not taking the disease. They admit that it had looked something like small pox, and kept up direct communication with the Lund family, that I presume is the source it is from. Now as far as regards small pox in Stanchfield, everything is lovely; not a new case and all well. I have completely and thoroughly disinfected

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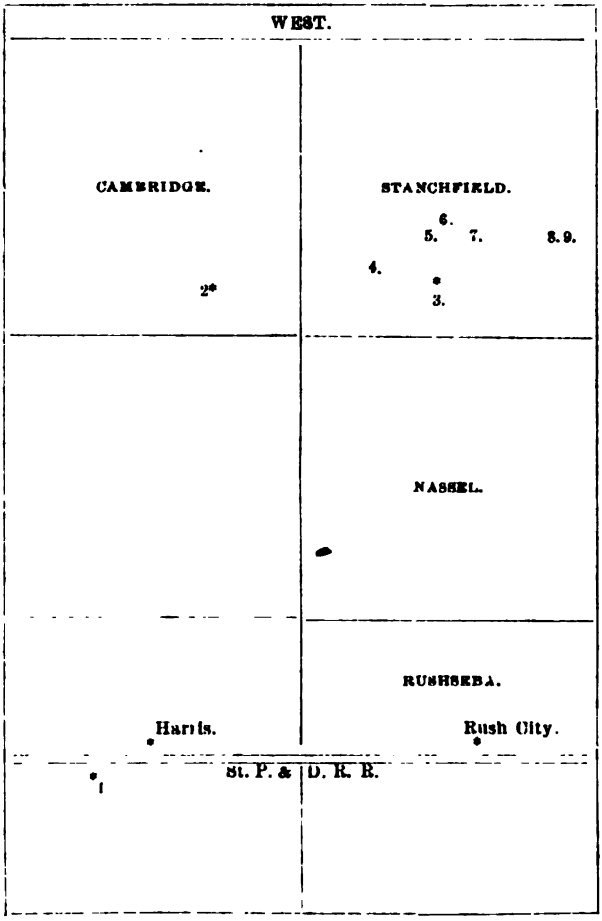
Lund's place. (They grumbled because my fumigation made the leaves drop off their house plants) Hans Erickson's (Flecks), Gustave Peterson's, but keep them under quarantine until Jan. 5th, when I calculate to set them loose. Shall be through with the balance in about ten days. Vaccination has worked like a charm in the families of L. Lorin and S. Olsen. We noticed a sort of Varioloid on the body of one seven days after vaccination which disappeared the next day. One of them has a bad arm; it is pitting in quite deep. I have washed it out with carbolic acid solution and think I'll save the arm all right.

Respectfully,

E. A. UMLAND.

PLAN OF TOWNSHIPS SHOWING LOCATION OF CASES OF SMALL POX.



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EXTRACTS FROM

Report of Local Board of Health of Stanchfield.

December 20, 1882.

To the State Board of Health:

The history of the small pox epidemic in the town of Stanchfield is as follows:

In the beginning of July, 1882, Mary Lund returned home from Minneapolis and came down with small pox, resulting in the family thus:

Aug. 1st, died Louise Lund, aged.....17
" 2d, " Fred " " 11
" 8th, " Mary " " 19
" 9th, " Peter " " 15

Eddy, eight years old recovered, both eyes blind; Rosie, one eye blind. It was known to be small pox before any one died. Dr. Caldwell, of Cambridge, attended the cases. It seems that things have not been cleaned sufficiently, because after visiting Lund's in October, Christine Erickson got sick and died October 12th. In her house also died Ole Fleck, Oct. 22d. Next sick was Mrs. Medine, her daughter Betsy and lastly Olaf, all recovering; had been vaccinated. In that house there are eight children who had been successfully vaccinated six months ago—none of those took the disease.

Jan. 8, 1883. Dr. Umland reports disinfection complete and quarantine raised.

HARRIS STATION, FISH LAKE TOWNSHIP.

Dec. 27th, 1882. Under this date Dr. Umland reports the rumors of an outbreak of small pox in the family of one Elmquist at Harris, Chisago County. None of that family have been here, (Stanchfield, Isanti Co.) nor any one there from here, except one traveling quack and preacher, who was on Nov. 25th at Dahlman's house in Cambridge, where the small pox was at that time. From thence he went to Harris and stayed over night at Elmquist's. One child is dead and another sick.

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Dec. 27th. Dr. Alf. Fleischburg, of North Branch, reports by telegram and letter same facts. "House and family quarantined. Shall we quarantine the trains?"

Secretary answered: "Have telegraphed Dr. Umland, in charge at Stanchfield, whence these cases evidently came, to meet you. Sent circulars, laws, &c., to him and to local Board of Health. Also wrote to them to act promptly. Vaccination being thoroughly done, and quarantine, you need not interfere with trains."

Dec. 28th. Jonas Jonason, Clerk Fish Lake Township, in which is Harris: "The local Board of Health all absent. We will follow Dr. Umland's advice. On Dr. Fleischburg's advice we put up notices, and quarantined house. The doctor was vaccinating here on the 26th. We do not know what we shall do if this is true small pox." Evident hesitation in the selection of a Health officer.

Dec. 29th. Jonas Jonason reports a temporary Board of Health organized by Dr. Umland, and the order for the quarantine of the first infected, and also those of John Bruch and Joseph Richard, and that Dr. Umland be elected Health officer at $15.00 per day.

Dec. 29. Dr. Umland reports: One child sick with small pox in Almquist's family; one had died two days before. I have instructed the two justices and one supervisor to fill vacancies according to law by appointing supervisors and have them sanction action of temporary Board. Another case in same family threatened. Vaccination working well on rest of family."

"My report as to the preacher who brought the disease, is too true. Since then he has slept in this house where are cases of the disease, and started home, seven miles west. I have this evening ordered his house and family quarantined, (they have been badly exposed) till I can attend to them. Great majority here have been vaccinated, as the people are afraid of small pox and will not expose themselves knowingly. Just heard from Stanchfield that all is right. Six days more will decide for Harris. The sick family live ¾ mile S. E. of station."

Jan. 1st. Dr. Fleischburgh writes about as above, and that he believes himself elected Health Officer.

Jan. 2d. He telegraphs: "Six cases in all at Harris, in two families."

Jan. 3d, 1883. No change.

Jan. 6th. Of the six cases last one is Variola, the rest Varioloid, because of vaccination, which has been used freely in the infected families.

Jan. 8th. One new case; discrete and doing well. No further cases. Have raised quarantine on two houses, leaving only the original one. Will as you suggest be very careful about the last house.

Jan. 13th. No new cases.

Jan. 18th. Last case convalescent and up. How long shall I maintain quarantine of the house? Answer by Secretary: "Until sick are perfectly well, all scabs, etc. removed, and until fourteen days have passed from time of last exposure in the family. If vaccination has worked well in all families not sick, raise quarantine

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as soon as last case is well as above, the house, clothing etc. thoroughly disinfected and cleaned up.

Feb. 3d. Dr. Fleischburgh writes, sending final report and asking how long can a corpse be considered contagious after burial. The Almquist child is buried near the house and they wish to move the body to cemetery.

REPORT OF

The late outbreak of Variola at Harris, Town of Fish Lake, County Chisago, Minn., during the months of December 1882, and January 1883.

To the Hon. Board of Health, State of Minnesota.

At or on the evening of the 3d of December, 1882, a travelling Adventist minister, a certain Mr. Carlson, professing to have some knowledge of medicine, had paid a visit professionally as well as minister and as physician to a Mr. Dahlman of Stanchfield, Isanti county; his house at the time infected with Variola, and with three or more fatal cases in the family; staid over night in this house, prayed over the corpse of a child dead of small pox; started next day, or 4th, without taking any precautions whatever, to the house of Mr. Almquist, of Harris, came there on the evening of the 4th, staid over night, infecting the house with the dreaded scourge.

On the 15th, two girls, Florence and Fanny, were taken sick, but the parents not perceiving the danger thought it of no importance; this same above named Carlson paid them another visit, and although I think he recognized the disease (indeed he took the precaution of vaccinating those well, but unfortunately the virus was not good and did not work." He told (Almquists) then that it was nothing but a bad form of "measles" and left the house without telling the truth about the matter.

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On the morning of the 26th, same month, I was called by telegram to see the family. I found there one girl, Florence Nettie, four years old, dead. She died just an hour before my arrival. The other, Fanny, had the "confluent" variety of which also the other died. I vaccinated all the other members of the family. * * * * * I quarantined at that time the three houses laying on the same road, and vaccinated all that had been in contact with the family during the sickness. I then telegraphed to you about the outbreak, and got the answer to wait for telegram from Dr. Umland, of Rush City, to meet at Harris and investigate about the origin and outbreak of the scourge, but did not receive any telegram from him. He went down to Harris and took charge of the cases, vaccinating and quarantining amongst others the above named Carlson, living about seven miles from Harris close to Stanchfield. On the 30th I went up to see some other patients at Harris, the Board of Health wanted me to take charge of the matter; I did so, and was duly appointed Health Officer by the local Board.

Paid the house a visit on the 30th. Fanny was then improving splendidly under my directions, with addition of cream of tartar water prescribed by Umland to be drank freely, also with addition of lard or cosmoline and carbolic acid in accord to directions in the *tract*. But two other children, Belle, twelve or thirteen and Arthur three years old, was taken sick in the morning of the 30th, also Mr. Almquist complained of malaise, later on developing to a slight attack of Varioloid. Discontinued the use of the salve as it did not disinfect so well as the wash. Directed *only* this to be used three or four times a day over the whole body and five or six times over the face and hands.

Jan. 2d, 1883. Visited them again; found Fanny improving steadily, Belle very sick and eruption coming out quite freely. Her case proved to be of the "discrete" variety. Arthur had also a few pustules of the same variety. Mrs. A. was taken sick the day before with a very mild attack of Varioloid; the vaccine was working this time on all of the family. Had been using both humanized and bovine virus (Umland using humanized). Mr. Almquist was very much improved. * * * * * Visited same day the house of Mr. Burtch, the next neighbor, who was reported sick and had been exposed the whole time from the first infection; found him to have a very mild form of Varioloid. During all this time the greatest precautions were taken so as not to spread. Quarantine strictly attended to and vaccination universal in the village. On the 3d revisited the family; found Fanny still improving and sitting up in bed. Mr. Almquist much improved, and Mrs. Almquist up and around. Belle not so feverish and not so sick in general. Paid also another visit to Mr. Burtch, who was doing nicely, and as the vaccine was taking on all the other members of the family, did not have any more cases in this house.

6th. Paid Almquist a visit, found Fanny improving; with a good appetite, up and around, sleeping soundly at night. Arthur had

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no more pustules than before, and improved fast. Almquist and Mrs. Almquist were quite well and able to take care of the cases themselves, discharged the nurse. Fanny complained of sleeplessness, but otherwise getting along; did not use the carbolated lard or cosmoline at all in her's or Arthur's case as I found it not doing so much good as the wash, this drying up the vesicles in five or six applications, leaving them blackish brown ready to scale off, and at the same time disinfecting more thoroughly, allaying the itching, etc.; directed the same lotion as Fanny for hands and face.

From this time on the cases progressed favorably and no other cases have appeared, wherefore on the 21 day of February I raised the quarantine on all the houses, and the village was considered free from the dreaded guest. I disinfected the houses exposed thoroughly—Mr. Carlson on the 10th, Mr. Burtrel on the 17th, and Almquist on the 2d of February. If from my small experience, I could form an opinion, I think the greasy salve of lard or cosmoline, not the "desideratum" wished for, as it seemed to keep up the suppuration longer than was necessary, leaving deeper scars and pitmarks than the wash. I may be also allowed to mention that this wash is greatly used in the "pest hospitals" in Sweden and Norway.* Another reason why I think it superior to the salve is that it is much cleaner and more easy to apply and use than the salve.

Respectfully,

ALF. FLIESBUG, C. M., PH. PH. D., UPS., SV.
Health Officer, Town of Fish Lake, Chisago Co., Minn.

North Branch, Chisago Co., Minn., Feb. 3d, 1883.

* A weak solution of Bi-chloride of Mercury.

MORRISON COUNTY.

TOWNSHIP OF CULDRUM.

First notice of outbreak, May 30th, 1882.

Cases of Variola..... 8

Deaths..... 2

Date of last report, July 8th. 1882.

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TOWN OF CULDRUM.

May 30th, 1882. Dr. A. Guernon reports a case of Variola, a young man twenty years old, in town of Culdrum, fifteen miles west of Little Falls. Reported to have contracted disease from parties immigrating from Wisconsin.

May 31st. Dr. Guernon reports case dead, and no more cases.

June 1st. Secretary wrote to local Board of Health, Culdrum, calling for immediate report.

June 5th. Dr. W. H. Ewing, of Long Prairie, reports the case dead, and others coming down.

June 12. Reports four cases in same family, two confluent and two distinct.

June 13th. Mr. Campbell, Chairman local Board of Health, replies: "Four cases in Mulqueney family. No other family affected. (The first case was here and died). All up but one. Family secluded. Vaccination working well in the neighbors. A strong opposition to vaccination among our people. Dr. Ewing Health Officer.

The Mulqueney children (three small ones) vaccinated, but it did not work.

June 19th. Dr. Ewing reports three more in Mulqueney family—oldest not expected to live.

June 24th. Mr. Campbell reports oldest son at Mulqueney dead. No other family affected.

June 28th. All living, better, and up. Father and mother alone escaped(from a previous vaccination) I think house and clothin should be burned—advise us.

July 1st. Secretary replied: "Burn bedding, etc. as soon as family can be moved; but unless the house is a worthless hut, you can disinfect it with burning sulphur, thorough cleansing and white washing."

July 8th. Mr. Campbell reports "family all well. Two oldest have been cleaned, furnished with new clothes, and discharged.

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Have ordered Health Officer to come down and prepare for the final cleaning up.

"Your instructions carefully obeyed. I think house of Mulqueney and its contents should be destroyed."

Jan. 10th, 1883. In answer to a demand for a clear account of the origin of this outbreak, Mr. Campbell replies: "First case a resident of Todd County, went to Michigan. He came home in the spring and took sick. He had a very slight attack of the disease. He lived with the young man John Mulqueney—the first victim in our town. They slept together till Mulqueney began to feel sick, when he went home and died of confluent small pox. I have presented bills to the County Commissioners, and they decline to pay as having no right to do so. I have paid the money out of my own pocket for the necessaries of life for that family and for new clothing, and personally attended them for six weeks. The infected property was all destroyed, and they(the family) would like their pay for that. Please instruct me. Answer by secretary: "Sec. 58 page 54, 'Laws of Minnesota relating to Health' give full details as to how your town supervisors are to collect their bills. This Board have no authority to audit or pay such accounts."

LONG PRAIRIE, MINN., Jan. 8th, 1883.

Dr. Hewitt,

DEAR SIR:—Your favor regarding a report of small pox in our county and Morrison, received. I hasten to reply.

On the 27th of May, 1881, I was called to visit Mr. Swanson, in eastern part of our county, whom I found to have small pox. I visited him a second time. I vaccinated all who would submit to it in the neighborhood. After the man was out of danger, I with two other men appraised Swanson's goods and burned the house and contents. That appraisement bill with mine, was put before the County Commissioners. They allowed the bill for goods and the building, but Mr. Swanson being present, they persuaded him to pay the doctor bill, which he did.

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ORIGIN OF OUTBREAKS.

The Swanson case in our (Todd) County was brought over from Sweden.

Happened May 27th, 1881.

The Mulqueney family, Morrison County, caught it from a man coming from Wisconsin, who had the Varioloid.

Happened May 27th, 1882.

STATEMENT OF THE MULQUENEY SMALL POX CASES.

On the 27 of May, 1882, I was called by Dennis Mulqueney of Coldrun, Morrison Co., Minn., to visit his brother who he said had been sick about a week. I went and found him down with small pox having been broken out four days. He lived about eight days after I saw him. When I was down the first time I satisfied the chairman of the Town Board, Dr. Campbell, that small pox had broken out in their town and that all who had not recently been vaccinated should be. He said I should come and attend the family (at this time the father of Dennis and two others with the father had been exposed) as others of them will likely come down, and no doctor from Little Falls would come to see the case. I told him I would do so but could not visit them for less than one dollar a mile. It is a good eighteen miles out there from our place. He said he would see the rest of the Board and see that I was paid.

John, the one who was sick, died after fourteen days illness, of small pox. Three or four days after John's death (I had visited him a second time), I was informed by Mr. Campbell, that Dennis had come down and he said they were in need of a physician, and in bad need, as others in the house, the sister and brother, were feeling sick. He, Mr. Campbell, had got vaccine matter of a doctor in Little Falls and had been using it in the neighborhood. But before this and on my second visit to John, I vaccinated all in that neighborhood that I could see at that time, including the brother and sister in the house. I went on Mr. Campbell's promise that he would see that I was paid, and made eight visits furnishing brandy, goose oil, and such other medicines as I thought necessary, for within a week of Dennis' taking down, five others (all in the house excepting the father) were taken. I gave them the best attendance I could, and on my first visit to Dennis (John having died) finding his to be of the confluent variety, I resolved (and told Mr. Campbell so) to go on to Little Falls to see whether a physician from that place could not come out and help or take charge of the cases, as more were likely to be taken, and as they were nearer by eight miles than I was; so I went to Little Falls. Found only one physician at home, and he would not venture out. Knowing that the American Medical Association was in session in St. Paul, thinking too, that I should meet a number of the State Board of Health there, I took train and was soon in St. Paul, where I met Dr. Hand and yourself the day following, Friday, June 9th, and

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the last day of the Association. As you remember, I met you at the Merchants and talked the matter over with Dr. Guernon, of Little Falls.

On the 21st of June, Dennis Mulqueney died. I attended the rest that were sick, going when I thought best. They all got well, being younger and having lighter attack of the disease.

On the 12th of July 1882, at Mr. D. Campbell's solicitation, I went to the Mulqueney house, and with two others appraised the goods, and as it was the sentiment of the whole town to destroy the house as well as the goods we set a price on it, and with it set fire to and burned the house and the goods. I told Mr. Campbell when he spoke to me to go help appraise, that I could not go as cheaply as others nearer could, as I needed to be at home attending to my practice. He said I was their Health Officer, and it would give better satisfaction for me to be there, so I went. My charge for a visit eighteen miles was eighteen dollars, but owing to my being detained longer at the appraisement and burning of the house and goods I put that at ($20) twenty dollars.

Mr. Campbell informed me their County Commissioners met soon, I think in July, so I made out my bill and sent it down by Mr. Campbell who had a bill for services and goods furnished the sick people—the Mulqueney family while sick—and he presented it. It and all the bills were rejected, the commissioners saying it came under the head of pauper bills and in their county every town settled its own pauper bills. At their October meeting Mr. C. again plead before the County Board of Commissioners the honesty of these claims and the inability of their Town Board to pay so heavy a bill, but they refused to allow any bill or any part of them.

I saw Mr. C. in November last and he made me this statement with regard to his efforts to collect of the County Commissioners and said he felt it of no use to try further.

About the time I saw Mr Campbell in November, I wrote you for information and also to Dr. D. W. Hand, St. Paul, and received a copy of your recommendations and the state laws bearing on such cases.

Mr. Campbell is an honest man and I feel sure he has put in no bill beyond what is just. He was very attentive while the family were sick and tried to do right. The Mulqueney family have gone back to Wisconsin without pay for their goods or house, feeling themselves robbed of what little they had when they came to Minnesota. Mr. C. is out cash paid for new clothes and bedding for the family and goods and groceries to help them when they got well enough to go to housekeeping. I am out just the amount stated on bill enclosed, and any help you may secure me will be thankfully received.

Yours sincerely,

W. H. EWING, M. D.

N. B. Herewith find part of correspondence between Mr. C. and myself and the bill as I made it out, which please return as soon as you are through with it. Bill will show date of claims.

W. H. E.

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PIERZ TOWNSHIP.

First notice of case, Nov. 24th, 1881.

Number of cases..... 1

Cases doubtful..... 1

Date of last report, Feb. 23d, 1882.

Nov. 24th, 1881. In reply to inquiry from secretary, Dr. J. McManus of Little Falls: "One case Pierz Township, fifteen miles from Little Falls. House and family early quarantined and every precaution taken; vaccination general, every one accepting it."

Feb. 22d, 1882. Another case reported in Rich Prairie, this county. Secretary applied to Dr. A. Guernon, of Little Falls for information, also to Dr. Stein of Little Falls, reported in charge, also to Board of Supervisors of Rich Prairie, sending circulars on small pox and copies of the law.

Nov. 23d. Dr. Guernon replied: "A woman of Rich Prairie was taken sick after visiting Spring Hill, Stearns Co. last November. A quack attended her, but I doubt its existence. No other cases here now."

April 11th. Further reports coming to the Secretary he wrote to Dr. Guernon this date for facts. He replied: "Do not believe there has been a case in the county."

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SCOTT COUNTY.

First notice of outbreak June 28th, 1882.

Number of cases..... 38

Number of deaths..... 9

Date of last report, Aug. 22d, 1882.

June 28th, 1882. Dr. L. P. Dodge, of Farmington, Dakota county, telegraphed Secretary, (from Fairfield): "12 cases small pox 12 miles west of here," and writes: "There are 7 more cases, and if a doctor from Shakopee, Scott county, is not attending them they have no medical attendant. People are very anxious—one dead and 150 attended funeral. First cases are in Credit River Township, Scott county, 6 miles west of Fairfield. The others on Dodd road, 5 miles north of Fairfield."

June 28th. Secretary telegraphed Dr. Dodge for name of town and direction of Local Board, and went immediately himself to Shakopee and with Dr. Jas. H. Dunn, went into the infected district, visiting and organizing local Boards of Health in each of three towns, and secured the election of Dr. Dunn, of Shakopee, as Health Officer. The adjacent corners of these contained at that date six infected families. Dr. Hewitt returned to Red Wing, June 30, 1882.

July 3d. Dr. Dunn reports four new cases 2 miles from Sauver's, (the original cases.) Total to date, 16.

July 5th. Dr. Dunn for Credit River reports; "19 well marked cases and two suspected in five families within a radius of three miles. I have trouble with ignorant officers. All infected have visited at Sauver's except one child who caught it at school from one of the Sauver children before that family were quarantined."

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The newspapers in adjacent towns helped materially in urging vaccination on the people exposed to infection.

July 7th. Dr. Dunn reports: "No new cases. Young Sauver aged 22, died last night. Local Boards begin to grumble as to expense, and doubtless you will be needed to settle this matter. I regret that I permitted myself to be enlisted in this work, but as I am in I shall do all I can." Secretary wrote, promising to come when wanted.

July 10th. Secretary wrote: "Have seen Governor, who has requested the Attorney General to enlighten local Boards as to their duties. Have *what you need for yourself and patients* and the towns must pay for it." At this time Dr. Dunn was giving his whole time to those thankless people, sleeping in a school house and cooking for himself, people refusing to entertain him, and he having to go to Shakopee (20 miles) to get provisions.

July 11th. From school house, Credit River, Dr. Dunn writes: "Situation about the same. Mr. K's baby died yesterday, wife will follow. Another case put in the infected house. Have not done much vaccinating. They refuse to take it from me. But my brother and physicians of adjoining towns have done that work very thoroughly. Animal virus works very capriciously. Have not been able to collect much eight-day humanized lymph. My brother has collected 3 or 4 dozen points. I believe the disease will not spread further and that three weeks will wipe it out. I have two cases who came down, after vaccination, with symptoms of small pox like all others in that family, the eruption began to appear, and I thought vaccination had failed; in three or four days the eruption failing to progress, dried up and amounted to nothing. They complained of their arms, and upon examination, I found vaccine working finely, while two of their brothers are lying at the point of death with confluent small pox. They were vaccinated but took Variola the next day, while the first had been vaccinated five days before symptoms of Variola appeared. These are remarkable examples of the modifying power of vaccination done several days after exposure, (the incubation of small pox is fourteen days). I shall send for you when we come to clean up."

July 12th. Dr. Dunn telegraphed the Secretary of the State

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Board to come up, as there was much grumbling as to expense and neglect of orders, and of patients. He went the same day to Shakopee, and the next morning was at Credit River. Meeting each local Board or chairman thereof, he secured their approval of Dr. Dunn's action and their authority for such steps as should be necessary to care for the sick and control the disease. Dr. Hewitt returned home through Lakeville, and from there telegraphed Bishop Ireland, of the Roman Catholic diocese of St. Paul: "Father Plut (of Shakopee) will help Dr. Dunn in small pox district. Please give permission immediately. Answer me at Red Wing."

July 17th. Bishop Ireland, with characteristic promptness, answered: "Your telegram was received Saturday at 8 p. m., too late to permit me to act on that day. Since then a letter has been sent to Father Plut, authorizing him to co-operate as best he can with Dr. Dunn * * *."

July 22d. Dr. Dunn reports: "All going well. No new outside infected families. I have two nurses, one sent by Dr. Leonard from Minneapolis, at request of Secretary. Expect to clean up in ten or twelve days."

July 24th. Secretary notified Dr. Dunn of Father Plut's appointment, and that "towns adjacent will recognize his pass. Look out for infected clothing in cleaning up."

July 26th. Dr. Dunn reports: "Last night one more case died and one new one developed, but in infected family. Only two cases now very sick. All but four convalescent. People very much afraid of the disease, much more so than when you were here. It will be very difficult to disinfect some of the houses. I fear attempts to hide unclean clothing. That is the tenor of the conversation of some parties. What should and what should not be burned? I suppose all feather beds and clothing worn by the sick should be burned. More valuable pieces which may be, should be, disinfected. Am I right?"

July 28th. Secretary replied: "Page 34 of 'Laws relating to Health' gives authority for the action of such boards. Make thorough work and burn what you cannot surely disinfect, of which you and your board are the judges."

Aug. 1st. Dr. Dunn reports: "Cases convalescent, except three,

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and two of them out of danger. Have had forty cases and eight deaths. Have reports of cases in Hennepin County you had better investigate. (See report of small pox in Hennepin Co. H.)

Aug. 5th. Dr. Hewitt acted on Dr. Dunn's suggestion and notified him thereof.

Aug. 7th. Dr. Dunn reports: "On Wednesday last after six weeks seige, I left the infected district in charge of my brother, as all remaining cases are convalescent, and came home to Shakopee after making an arrangement with the board to carry out my directions. They promised to get a man to visit the houses and do the running. To-day my brother returns and reports that they cannot get a man to do the work. I feel very anxious but my private business is suffering, and as no one is sick, I cannot spend more time in the capacity of chore boy and guard. Town Board angry because County Board refused to help, and so they decline further expense for the town. I fear that a lack of quarantine for the next two weeks will undo all our work. I am sick; let me hear from you soon. I have done all I can for the small pox district which my means will allow. If I have to pay all the bills I have made and wait for *my* pay it will greatly embarass me financially. My private business with my labor out there have turned me sick. What shall I do? I will not take the responsibility to hire a man and be responsible for his pay, and the Board say they will not."

Aug. 11th. Secretary telegraphs: "How much will necessary guard cost? Answer immediately," and wrote officer to advance money for nurse if the doctor would get the Board's order for the expense.

Aug. 14th. Dr. Dunn reports: "My brother just in from Credit River. All cleaned up but two families. Board would object as much for the future, as at present, to pay a guard. I believe now we can manage them without a guard. I will manage to make a few extra visits myself and get along without a guard, as the chairman of the Board attends one family, and a neighbor the other.

Aug. 19th. Dr. Dunn reports the epidemic ended.

Aug. 22d. Secretary congratulated Dr. Dunn on his successful

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campaign and asked for a statement of the financial difficulties incidental to the working of existing laws as to control of infectious diseases as illustrated by his experience. The Report written for, and read at the Sanitary Conference at Minneapolis, will be found in the General Report of that Confereuce further on.

The following analysis is published herewith, because of the light it throws, (by means of a consecutive narration of facts) upon the relation of vaccination to small pox in families already infected by the latter disease.

RESULTS OF VACCINATION AND OTHER NOTES ON SMALL POX IN SCOTT COUNTY.

(A paper read before the Minnesota Valley Medical Society, by James H. Dunn, M. D., late Health Officer in Infected Towns.)

Small pox has been so long and thoroughly studied that little of interest is reserved for the observer of to-day to report, unless we bring to light something startling as to the specific contagion, thus leading to improved methods of prevention and cure. It were needless to say that I have no such brilliant discovery to report to the society. However, I have noticed the growth of discussion and doubt among the semi-scientific lay public upon some points connected with the disease, which have long been pretty well settled in the minds of experienced medical practitioners. Facts like the preventive value of vaccination supposed by many of us to be as firmly established as the laws of gravity, are only recently beginning to be formidably disputed. The public is far from convinced of its value, and fanatics seem to be daily increasing this doubt. It appears to me that at such a time the old concocted and selected statistics of the anti-vaccinationists should be met with the new ones of each epidemic, however small the number of cases. In fact there is not likely to be opportunities again for viewing epidemics of the magnitude of anti-vaccination days. This together with the fact that in these days some physicians of experience rarely meet with the disease, and hence often make errors in diagnosis which, to say the least, do themselves great

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injury, has induced me to offer to the society the following notes of the outbreak which last July occurred in Scott county.

June 7th. Wm Sauser, aged 17, who had not been off the farm for months, was taken sick. Some four days later a passing physician was called in. He was a man of experience and intelligence, but seems not to have made a very positive diagnosis, and was not again called. The youth died June 16th, six other members of the family meanwhile having been attacked with like symptoms. The father invited passing neighbors to see the boy. Some remarked it looked like small pox, and at last the old man admitted that he believed it was that disease, but enjoined them to tell no one, lest everybody shun them. Children were sent to school until the School Board became aware that some contagious disease existed in the family, and suspended them. Only for a casual word dropped by a neighbor, and the good sense of the Board, the neighborhood of 20 or 30 families would have been infected through the school. On the 26th of June, a rumor reached Shakopee that the Sausers had small pox, and I at once visited them, finding six very bad cases. On the 29th a case was discovered in the family of Mr. Sauber who had visited the Sausers daily, also two young men, sons of M. R., who were invited in to see the first case, were attacked July 1st. Mrs. Kline, whose husband had worked at Sausers, Ida B. who sat by one of the Sauser children at school, and Maggie L., who had played with them, were all attacked. The State Board of Health had been informed and the secretary was promptly on the ground, organizing boards of health in the three townships. Iwas appointed Health Officer, and on taking charge, I found that we now had six infected families aggregating 58 persons in the adjacent corners of three towns, within a territory of about five miles square. the trip by the road to visit each house being about 20 miles. Previous to the outbreak, I believe none of the children had been vaccinated, most of the parents had in infancy or youth been vaccinated, and two had had the disease. On the 27th a physician vaccinated the Readymaker family, and on the 28th my brother, a student in my offlce, with a package of fresh bovine lymph vaccinated the Lannigan family, four of the Sauber family (the others were not at home at the time) and the neighbors who had been most exposed. Barbraus family, on various pretexts refused to be vaccinated on that day, but a few days later the children were vaccinated by him with lymph from a new supply which proved to be worthless. From June 29th until the 12th of August a most thorough quarantine of the infected district was enforced, and neighboring communities thoroughly vaccinated. The houses and inmates were then disinfected, and the quarantine broken up. No cases have since occurred in the county.

Of the fifty eight persons in the six families, thirty eight had the disease and nine died. Fourteen cases were confluent; nine were varioloid; fifteen were discrete.

The following tabular view of the cases will show the status of affairs in each family briefly:

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I. SAUSER FAMILY—TEN PERSONS.

No.	Name	Age	When Vaccinated	At-tacked	Remarks
1	Will'm	17	Never	June 7	Died on 26th confluent small pox.
2	Matilda	5	Never	" 21	Confluent on face. Convalescent July 7th.
3	Josie ..	9	Never	" 22	Semi-confluent. " July 8th.
4	Mary .	13	Never	" 23	" " " July 8th.
5	Kate ..	15	Never	" 24	Discrete. " July 4th.
6	John ..	24	Never	" 25	Confluent. " July 13th.
7	Frank .	20	Never	" 26	" Died July 6th.
8	Lorenz.	22	Never	" 28	" " July 15th.
9	Mrs. S.	47	In Infancy	" 22	Varioloid, with six or eight vesicles.
10	Mr. S.	50	—— ——	——	Had small pox in youth.

No other persons were connected with the family except and Sauber, who took the disease home to their families.

II. LANNIGAN FAMILY—TEN PERSONS.

No.	Name	Age	When Vaccinated	When Attacked	REMARKS
1	Mrs L	40	June 28	Not attacked	
2	Mr L	?	" "	" "	
3	John	16	" "	" "	
4	Pat	14	" "	" "	
5	Mike	12	" "	" "	
6	Martin	8	" "	" "	
7	Ellen	6	" "	" "	
8	Sarah	5	" "	" "	
9	Maggie	10	" "	July 30	Had discrete form, convalesced July 10.
10	Mary	9	" "	Not attacked	

This family of ten persons apparently under precisely similar conditions with the Sauser family except that each and every member was vaccinated by my broher, June 28th, living in a small house, all in the same room as the patient, had one mild case of the disease. This patient came down two days after the operation, having been exposed while playing with the Sauser children two weeks before. Of course the small pox contagion had almost matured in the system before the vaccine virus was introduced. We are also intitled to believe that the mild course of the disease was in a measure due to the vaccination, though the vescicle at the point of operation was not typical.

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III. READYMAKER FAMILY—TEN PERSONS.

No.	Name	Age	When Vaccinated	When Attacked	REMARKS.
1	Mrs	48	In Youth	July 13	Very mild Varioloid, not in bed.
2	Mr	20	" "	Not [illegible]	
3	John	25	June 26	June 27	Soon confluent, convalesced August 3.
4	Joseph	21	" "	" 27	" " " July 26.
5	Henry	19	" "	" 29	Eruption aborted " " 12.
6	Josie	16	" "	" 29	" " " " 12.
7	Mary	17	" "	Not attacked	Three times re-vaccinated unsuccessf'lly
8	Peter	12	" "	July 20	Discrete, not very sick.
9	Wil'm	8	" "	Not attacked	First vaccination failed, second worked.
10	girl	6	" "	" "	" " " " " "
11	"	4	" "	" "	" " " " " "

In this family of eleven all vaccinated on June 29th with unreliable bovine virus, i. e. that of which nearly half the points failed to work, there were two very severe cases of confluent small pox. In these cases the vaccination did not work in the least. Cases 5 and 6 were quite as severely attacked as 3 and 4, but it was noticed after two or three days that the eruption which started out very thickly had mostly disappeared, and on looking at the arms the vaccination was found to be working fairly. Not a single vesicle matured in either case and there was of course no pitting, while John and Joe were scarred from head to foot. Most of the other vaccinations failed and were re-done by me during the first week of July. The house was a large one kept closed with superstitious care, lest a breath of air should touch the patients and destroy them. All efforts to secure ventilation was unavailing and every room of the house reeked with the characteristic odor of small pox.

IV. SAUBER FAMILY. FOURTEEN PERSONS.

No.	Name	Age	When Vaccinated	When Attacked	REMARKS
1	Mat	19	Never	June 26	Very severe confluent, convalesced July 18
2	Kris	37	In infancy	July 13	Rather sharp attack of Varioloid
3	Nic	½	June 28	July 11	Varioloid with ten vesicles; not much sick, nursed well till mother was taken then used bottle
4	Lena	18	Never	" 10	Said to have had small pox at 4 years of age. Died a putrid mass, eyes having run out Aug. 8.
5	Caroline	9	Never	July 11	Very mild discrete, convalescent July 20
6	Wm	4	June 28	" 8	Vesicles aborted, was not in bed
7	Henry	13	" 28	" 8	Abed one day, very mild Varioloid
8	May	14	Never	" 9	Discrete mild, sick 10 days
9	Peter	7	Never	" 9	" " " 8 "
10	Kate	15	Never		Semi-confluent, sick 20 days
11	Joseph	1	June 28		Varioloid, not in bed, played about yard
12	Susie	5	" 28		" " " " " "
13	John	21	July 12		Vaccination worked very hard or else he had Varioloid since eruption.
14	Wil'm	40	Never	Not att'ked	Had small pox in youth.

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In this family of fourteen there were two frightful cases. Six had been vaccinated, of whom four were not confined to bed; one vaccinated in infancy was quite sick; the other was a moderate Varioloid. Four who had not been vaccinated had the disease in a rather mild form, one very mild. The girl who died with terrible confluent small pox, I believe unquestionably had the disease when four years of age. She had numerous old pittings.

V. KLINE FAMILY—FOUR PERSONS.

No.	Name	Age	When Vaccinated	When Attacked	REMARKS
1	Mr K	30	Never	Not att.	Exposed day and night for 40 days. The on y unvaccinated case that did escape
2	Mrs K	22	Never	July 28	Confluent, died July 13
3	Peter	6	Never	July 3	Semi-confluent, convalesced Aug. 1
4	Infant	6m	Never	June 28	Confluent, died July 8.

VI. BARBRAU FAMILY—NINE PERSONS.

No.	Name	Age	When Vaccinated	When Attacked	REMARKS
1	Mrs B	50	In infancy	July 3	Pretty sharp Varioloid.
2	Mr B	55	Sev'l times		Two good scars. Escaped.
3	Kate	16	Never	July 13	Semi-confluent, convalesced Aug. 7.
4	Mary	14	Never	" 13	Confluent, died July 29.
5	Ida	12	Never	June 28	" " " 10.
6	Aggie	10	July 3	Not Att'd	
7	Cora	9	" 3	" "	
8	Peter	5	" 3	" "	
9	Infant	4m	Never	July 14	Confluent, died.

Thus we find of these fifty-eight persons constantly living with the disease as it were, one was not vaccinated and did not take the disease. Eighteen who were vaccinated, escaped entirely. The nine who died were, none of them, ever vaccinated. No deaths occurred among those who had ever been vaccinated. Nearly all the vaccinations that had been recently done and worked well offered a complete protection, excepting those performed from one to three days before the attack, and in all but two instances there was no pitting in such cases. In these two cases the virus is known to have been unreliable. But in families 1 and 2 we have a typical picture of what small pox is without vaccination, and of the glorious benefits of the operation seen at its best. The families are of the same size, living a few miles apart. The ages are nearly the same. On account of carelessness or parsimony neither family had

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been vaccinated. The small pox enters one, still they take no preventive measures. The disease has the same scope that it had in the ante-vaccination days and it quckly shows itself to be the same old pest that it was before the immortal Jenner robbed it of its terrors. Of the eight unprotected persons it rapidly destroys three, ruins an eye for yet another, and scars the other five, four of them girls, in a frightful way.

The other family of ten hear that they have been exposed to small pox, not aware that the disease has been already for ten days operating in the system of one of its members. They are vaccinated with a reliable bovine lymph. Two days later, one of the ten comes down with small pox which runs a mild course. They are all daily and nightly exposed to the disease, their vaccinations work well and not one of them is attacked. Could any man, not insane with some fanatical theory, look upon this picture and then upon that, and pronounce the difference a mere coincidence? It was my misfortune to begin practice with a degree of skepticism of the abilities of our profession to deal with disease, which to say the least, did little to add pleasure to the hard toil of general practice. More study upon the advancement of our profession during the past half century, in all its departments, in the prevention and alleviation of human ills, has convinced me that the physician may do more than take credit for nature's cures and comfort his patient with well meant but ill founded assurances of his abilities to assist him. The profession is fast becoming what it always claimed so loudly to be, the most useful one to mankind. But I have never seen anything outside of the mechanical, manual resources of surgery that made such an impression on me of the power of the physician over disease, as the difference clear-cut and distinct between small pox without vaccination and that following the proper, recent Jennerian operation.

As to other points about the epidemic there was little worth noting, of course nothing new. In two cases we were able to establish the period of incubation. It was in each case fourteen days. In one case there was slight, transient hemiphlegia following the

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attack. In two instances there were ulcerations of the cornea to interfere with sight.

As to the errors in diagnosis of which I have during the summer seen and heard several, I can only add these cautions to practicioners who visit cases many miles from their office, and who do not see the patient often.

1. We should all familiarize ourselves with diagnostic points of the disease; and often review them, holding in mind the possibility of stumbling when least expected upon a case.

2. More care in leaving patients in whose cases we have not come to a definite diagnosis without stating the fact to the friends, or calling soon again to complete the diagnosis. If a mistake be made before the eruption appears, the attendant will have an opportunity to early correct it—or if dismissed is free from the blame of the most ignorant. If such patient be left to report in case he gets worse, or if anything new turns up, he may fail to report, or he may get another doctor at a time when diagnosis is easy.

3. In cases of doubt, after the appearance of an eruption in the least suspicious, watch the case closely whether patient desires it or not until the point is clear. Or if patient forbids this, call a counsel, whether patient will pay for it or not. It will pay any physician in the country to go to any trouble rather than let a case of small pox go unrecognized, though he may not be really to blame.

CROW WING COUNTY.

FORT RIPLEY.

First report of outbreak June 21, 1882.
Number of cases of Varioloid.... 1
Last report June 29, 1882.

FORT RIPLEY.

June 21, 1882. A notice received from Dr. J. D. Simmons, of Little Falls, of a case of Varioloid at Fort Ripley. Wishing for instructions.

June 29. Postmaster of Fort Ripley reports a single mild case in Dr. Simmons' care. No origin reported.

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FARIBAULT COUNTY.

EMERALD TOWNSHIP.

First notice of outbreak July 25, 1882.

Number of cases of Variola..... 4
" " " " Varioloid..... 3

Total..... 7
Number of Deaths..... 3
Date of last report Aug. 15, 1882.

EMERALD TOWNSHIP.

July 25, 1882. Dr. F. McGuire, Blue Earth City, telegraphs Dr. Hand at St. Paul: "Small pox at Blue Earth City."

Aug. 6. The Secretary hearing nothing wrote to Dr. C. Hewitt for information.

Aug. 15. The Town Board of Health of Emerald reports to the Secretary on July 17th, the first official notice of small pox in our town; the first case not having been reported to us by Dr. McGuire. As soon as we knew it the infected house (John Conrad's, German) was quarantined. July 24th, a new case occurred in a neighboring family (Mr. C. Bottchus.) Dr. Hirsch of this place went in to inspect. July 25th, Dr. Hirsch declared it small pox. We then appointed Dr. Hirsch as Health Officer and at his suggestion the Conrad house was taken as a hospital and the last family infected removed thereto with all their goods. The vacated house was disinfected and cleaned, notices put up, etc. There being one more family in another part of same house. The doctor remained at Conrad's house till the last case was discharged, Aug. 12th, Then the house furniture was thoroughly disinfected and cleaned, and small pox notice kept on premises till all danger was past.

The Conrad family, six cases from 9 to 26 years of age, of which two died, July 22, 1882.

The C. Bottchus family one case, baby 5 months old, died July 26, 1882.

Aug. 15. Dr. Hirsch reports: Enclosure of above report and one case of varioloid in Blue Earth City. The case was getting well when I saw it. The other inmates of the house (2) had been vaccinated some years ago. House isolated and trouble now over. He offers a formal report. Secretary replied: Please send it. Nurse unpaid.

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REPORT

ON

THE METEOROLOGY

OF

MINNESOTA

FOR 1881-82.

By W. H. LEONARD, M. D.

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MINNEAPOLIS, Nov. 12, 1882.

C. N. Hewitt, M. D.:

DEAR DOCTOR:—As in former reports on Meteorology, the same plan has been pursued, viz: the mean temperature and humidity, and highest and lowest monthly, are given for each station for the given time, also the means for the seasons, and some comparisons of temperature and precipitation of different sections of the United States.

The following are the names of the gentlemen to whom your committee is under obligations for the data of this report:

S. Marlatt, Esq., St. Cloud; Solomon Blood, M.D., Owatonna; Wm. Cheney, Minneapolis; W. H. Pratt, M. D., Stillwater; J. H. James, M. D., St. Peter; Prof. C. M. Boutelle, Winona; C. N. Hewitt, M. D., Redwing, and J. E. Bowers, M. D., Rochester. Readings have been kindly furnished from U. S. A. Signal Service stations in the State, viz: Sergt. N. B. Conger, Duluth; Sergt. H. Bessant, Moorhead, and Sergt. P. F. Lyon, St. Paul. The comparisons are taken from the Signal Service U. S. A.

W. H. LEONARD.

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COMPARISON OF AVERAGE PRECIPITATION.

1880 AND 1881.	Nov	Dec	Jan.	Feb.	Mar.	Apr.	May	Jun	July.	Aug.	Sept	Oct.
	In.	*In.*	*In.*	*In.*	*In*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
Minnesota	1.63	1.68	1.68	1 78	0.80	0 79	....	5.32	1.72	4.94	7.05	3.06
New England	2 98	3.00	3.99	5 01	6.24	1.73	....	3.44	2 71	2 02	2 07	2.97
Gulf States	6.47	3.79	6.00	6.84	4.69	4.03	.....	4.21	3.28	4.81	5.57	5.44
Ohio Valley	3.09	3.08	3.21	4.47	2.80	2 84	.....	4.74	2 69	0 55	2.35	4.45
Upper Missouri Valley	0.23	1 08	1.07	1.26	0 48	1.28	.....	5.47	3.20	2.24	3 06	1 32
California Coast	0.17	12 33	8.08	4 17	0.93	1.82	.....	0 10	Trace	0 00	0 54	0 90

COMPARISON OF AVERAGE TEMPERATURES.

1880 AND 1881.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July.	Aug.	Sept	Oct.
	Deg.	*Deg.*	*Deg*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
Minnesota	.....	13.2	2.4	12.0	24 9	37.5	.....	65.3	71.6	70.2	55.8	44.0
New England	36.5	26.3	20.8	26.3	35.8	42.4	.....	60.5	68.3	63.6	65.6	52.2
Gulf States	46.6	44.9	43.6	48.7	54.4	64.1	... .	82.6	85.7	83.1	77.8	70.8
Ohio Valley	38.3	31.7	31.0	36.7	43.0	53 0	.....	74 6	80.6	78.8	74.9	63.3
Upper Missouri Valley	.....	10.8	4.9	13.6	27.2	41.2	.....	70.1	74.6	74.3	58.4	46.1
California Coast	51.2	50.8	50.8	53.8	55.3	61.1	.....	66.8	60.7	68.1	63.9	56.7

ST. CLOUD, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	53°	—21°
December	35°	—30°
January	24°	—32°
February	35°	—18°
March	40°	0°
April	70°	22°
May	82°	38°
June	82°	53°
July	88°	60°
August	90°	52°
September	83°	40°
October	69°	23°

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ST. PAUL, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	58°	—18°
December	38°	—27°
January	35°	—25°
February	38°	—9°
March	51°	9°
April	78°	10°
May	85°	3[illegible]°
June	92°	50°
July	91°	55°
August	96°	52°
September	91°	40°
October	71°	30°

DULUTH, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	44°	—13°
December	36°	—31°
January	34°	—27°
February	34°	—12°
March	51°	0°
April	75°	3°
May	74°	30°
June	83°	40°
July	95°	54°
August	93°	52°
September	76°	41°
October	72°	26°

MINNEAPOLIS, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	50°	—22°
December	40°	—32°
January	31°	—28°
February	35°	—12°
March	44°	6°
April	78°	7°
May	86°	37°
June	84°	54°
July	91°	59°
August	94°	58°
September	88°	39°
October	74°	25°

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WINONA, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	58°	—16°
December	36°	—23°
January	32°	— 7°
February	36°	—10°
March	47°	6°
April	85°	12°
May	92°	42°
June		
July		
August		
September		
October	68°	35°

ST. PETER, 1880 AND 1881.

	Highest Temper're	Lowest Temper're.
November		
December	37°	—23°
January	35°	—24°
February	37°	—14°
March	42°	7°
April	77°	16°
May	86°	43°
June	8[illegible]°	55°
July	88°	57°
August	98°	°58
September	92°	41°
October	68°	29°

OWATONNA, 1880 AND 1781.

	Highest Temper're.	Lowest Temper're.
November	56°	—19°
December	36°	—24°
January	30°	—24°
February	36°	—14°
March	46°	6°
April	77°	8°
May	87°	38°
June	89°	52°
July	88°	59°
August	94°	57°
September	88°	39°
October	70°	28°

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STILLWATER, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	60°	—19°
December	40°	—22°
January	26°	—27°
February	41°	—10°
March	65°	16°
April	79°	14°
May	90°	40°
June	92°	55°
July	96°	60°
August	100°	62°
September	93°	40°
October	80°	30°

MOORHEAD, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	54°	—20°
December		
January	34°	—36°
February	33°	—33°
March	40°	— 7°
April	73°	—13°
May	88°	29°
June	86°	46°
July	95°	47°
August	92°	45°
September	83°	30°
October	69°	17°

RED WING, 1880 AND 1881.

	Highest Temper re.	Lowest Temper're.
November		
December		
January		
February		
March		
April		
May		
June	87°	6°
July	90°	59°
August	97°	58°
September	83°	4 °
October	72°	34°

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ROCHESTER, 1880 AND 1881.

	Highest Temper're.	Lowest Temper're.
November	61°	—19°
December	34°	—22°
January	32°	—22°
February	37°	— 9°
March	45°	8°
April	80°	17°
May	82°	40°
June	89°	53°
July	88°	61°
August	97°	57°
September	92°	40°
October	7..°	28°

TABULAR VIEW OF SEASONS.

1880 and 1881.	Autumn 1880.		Winter 8[illegible]-81.		Spring 1881.		Summer 1881.	
	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hu m.	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.
St. Cloud	40.67	69.16	8 76	68.26	44.84	58 42	70.94	69.81
St. Paul	42.26	66 33	12 90	74.63	45.76	66.93	70 83	75.10
Duluth	39 40	75 60	11.36	82 26	39 13	72.70	64 80	72.26
Minneapolis	39 50	69.10	8.59	61.36	43.91	67.80	70 48	74.73
Winona	42 88	70 83	13.37	80 81	47.47	67.89	—-	——
St. Peter	—-	——	9 88	71.90	44.23	70.15	71.18	77.17
Owatonna	40 99	60.96	10.10	53 39	42.85	65.63	70.28	71.86
Stillwater	46 93	38 71	15.04	20.57	50.26	41 16	75.69	62.15
Moorhead	38.03	72 73	2.10	71 80	38.06	70.93	68.46	63.43
Red Wing	56 30	73 26	—-	-——	—-	-——	71.82	72.88
Rochester	41.32	80 61	11 87	90.42	45 23	70 47	70.53	72.77

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TABULAR VIEW OF MEANS.

1880 and 1881.	NOV.		DEC.		JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEPT.		OCT.		Annual Mean Temperature.	Annual Mean Humidity.
	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.		
St. Cloud	19 40	74 68	9.75	72.09	2.94	69 74	13 59	62 95	27 52	51.15	43 76	58 85	63 24	65 26	66 96	69 76	73.75	69 31	72 12	70.38	58.17	74 65	47 94	71 39	41.79	67 51
St. Paul.....	22 20	71 40	13.90	75.70	7 70	73 60	17 10	72 80	30.30	71.40	41.20	62 80	63 80	66 60	67.00	70.70	72 60	72 60	72 90	82 70	59 30	83 30	48.40	76 60	43 26	73.35
Duluth	20.00	85 70	12 90	87 80	5 50	79 50	15.70	79.40	28.20	73.80	38 10	70 30	51.10	74 00	56.90	73 90	70 50	63 60	67.00	79 30	55 90	79 80	45.30	73.40	38 92	76 71
Minneapolis	17.41	67 00	9.07	62.40	3.60	57 90	13 11	61 80	26.71	69 90	41.77	64.60	63 25	68.90	66 87	73.20	72.32	75 70	72.27	75.30	58.07	80.00	46.25	78 00	40 89	69.72
	28 days	25 days	27 days	26 days	25 days		26 days								12 days								24 days			
Winona	21 08	78 92	16.87	80 56	6 31	83 39	16.90	78.49	29.70	77.86	44 78	62 97	67.94	62 86	67.85	71 07	.....	.....	.....	.....	.....	.....	45 02	72.88	...	.....
																							30 days			
St. Peter.....	.....	....	10.45	73 10	5 82	76 70	13.39	65 90	28 66	76.15	42 21	65 80	63.81	68.51	67 69	74 67	71.82	77 70	74 01	79 18	58 71	81 48	45.99	76 19	43.69	74 12
Owatonna..	18 58	59.74	10.78	52.83	5 64	44 47	13 92	62 88	26 01	69 05	40 13	64 77	62 40	63 07	66 31	72 07	71 90	73.15	72 61	70 40	59 59	76 02	47.51	75 40	41.28	63.31
Stillwater ..	23 09	19.15	14.86	22 54	10 56	23 29	19 72	15 84	34 05	25.89	47 14	39.67	69 59	57 93	71.11	61 14	76.27	63 36	77.70	81 85	64 69	59 32	53 26	55 37	46.30	42 03
Moorhead...	17.80	77 80	.....	.....	-2 60	68.70	6.80	74.90	19 30	73.60	34.20	72.00	60 70	67 20	63.80	71 40	71 20	59.10	68.40	59.80	53 20	77.40	40 30	75 10	30.55	70.54
															23 days							29 days				
Red Wing...	.....	....	....	.....	....	....	...	...	.....	.....	....	.....	...	...	69 23	73 09	72 76	72.54	73.49	73.02	60.88	80 61	48 88	81 60	..	.....
Rochester...	20.70	84.19	12.86	91 23	7 03	87 21	15 74	92.83	29 18	78 34	42 88	67 70	63 69	65 38	67.24	74 74	73 19	73 08	71.18	70.49	61.21	75 80	49 28	67 38	42 84	77.37
Average of Mo'y Means.	20.07	68.73	12.37	68.69	5.25	66.45	14.59	06 98	27.76	66.71	41.82	62 94	62 05	65 97	66.63	71.42	72 83	70.01	72.17	72.24	58 97	77.83	47 10	73 02	42 02	68 51

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COMPARISON OF AVERAGE PRECIPITATION.

1881 AND 1882.	Nov.	Dec	Jan.	Feb.	Mar	Apr.	May	Jun.	July	Aug.	Sept	Oct.
	In.	*In.*	*In.*	*In.*	*In.*	*In*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
Upper Miss. Valley.....	1.46	0.29	1.17	2.26	2 98	3 21	4 71	7 01	3 29	3.19	1 36	3 75
New England.....	4 02	4.15	4 37	4.39	3 79	2 55	4.81	3 61	3.11	1.51	8 44	3.16
Gulf States.....	5 40	6.43	7 70	6 02	3 88	4 46	5.45	2 59	6.58	6.82	4.20	4 34
Ohio Valley.....	4.49	5 11	5 63	6.73	5.44	3.18	7 67	5.41	3.19	4.93	3.56	1.99
Missouri Valley.....	0 68	0 09	0.47	0.52	0.91	3.61	3 51	6.29	3 42	0.68	0.64	2.76
Middle Pacific Coast...	1 52	4.27	2.13	3.10	3 30	1 78	0.30	0.10	0 00	0.00	0.41	2.70

COMPARISON OF AVERAGE TEMPERATURES.

1881 AND 1882.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept	Oct.
	Deg.	*Deg.*	*Deg.*	*Deg*	*Deg.*	*Deg.*	*Deg.*	*Deg*	*Deg.*	*Deg.*	*Deg*	*Deg.*
Upper Miss. Valley.....	25 3	24 4	25.9	36 2	37 6	50 2	55 1	68 0	69.2	71.8	64 2	55.9
New England.....	41.2	36 8	24.4	29 8	35 5	42 7	50 5	65 0	70.6	69.6	62 6	54.9
Gulf States.....	54 8	52.6	51 4	58 2	63.3	66.8	71 0	79.1	79.0	78.5	74 0	69.9
Ohio Valley	45 5	44.1	35 9	44 4	46 9	54 2	59 7	70 9	72.3	72.6	66.1	60.5
Missouri Valley.....	29.9	30 0	25.1	33 6	38 1	50.1	55.9	71 3	71.6	73 0	65.8	54.3
Middle Pacific Coast...	52.0	47 3	46 0	46.2	52.8	54.9	62.5	66.9	72.0	64.7	63.5	58.3

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HIGHEST AND LOWEST TEMPERATURES.

1881 AND 1882.	St. Cloud.		St. Paul.		Duluth.		Minne'p'lis		Winona.		St. Peter.		Owatonna		Stillwater.		Moorhead.		Red Wing.		Rochester.	
	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.
November..	50°	— 3°	57°	28	54°	— 2°	54°	— 2°	56°	6°	56°	4°	56°	1°	53°	8°	48°	—15°	54°	8°	55°	8°
December..... .	47°	— 1°	52°	0°	47°	— 6°	44°	— 3°	49°	6°	47°	4°	43°	3°	52°	0°	43°	— 9°	58°	4°	56°	2°
January.....	39°	—20°	42°	—11°	47°	—24°	37°	—18°	41°	—12°	.....	.....	.....	.....	45°	—16°	33°	—36°	41°	— 9°	55°	—16°
February	47°	— 8°	57°	— 5°	53°	0°	54°	— 9°	60°	— 1°	57°	—11°	.....	.....	55°	—10°	49°	—15°	56°	— 6°	60°	— 5°
March....	45°	—16°	54°	2°	50°	— 5°	49°	— 7°	53°	17°	53°	6°	.. ...	.....	57°	6°	50°	—20°	58°	7°	58°	8°
April.....	....	.....	82°	21°	64°	20°	78°	25°	72°	32°	75°	26°	.....	.....	84°	28°	68°	7°	80°	27°	77°	28°
May.....	77°	30°	77°	3.°	74°	27°	79°	32°	82°	46°	77°	30°	.....	.....	82°	38°	76°	26°	75°	34°	76°	36°
June.....	87°	53°	84°	43°	80°	42°	83°	45°	91°	56°	82°	50°	.....	.....	91°	36°	85°	35°	82°	46°	83°	42°
July.....	....	....	92°	51°	86°	47°	91°	55°	96°	62°	80°	53°	.....	.....	94°	60°	88°	45°	....	....	87°	57°
August...	92°	56°	95°	46°	84°	50°	90°	55°	91°	65°	91°	51°	.....	.....	100°	64°	93°	38°	88°	57°	90°	51°
September.....	87°	34°	91°	36°	80°	38°	87°	36°	94°	51°	87°	40°	.....	....	96°	42°	84°	24°	89°	35°	88°	46°
October..... .	72°	30°	79°	32°	70°	34°	76°	28°	76°	34°	72°	26°	.....	.....	86°	32°	71°	25°	.....	.....	76°	27°

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TABULAR VIEW OF SEASONS.

1881 AND 1882.	Autumn of 1881.		Winter of '81-82		Spring of 1882.		Summer of 1882.	
	Mean Temp.	Mean Hum.	Mean Temp.	Mean Hum.	Mean Temp	Mean Hum.	Mean Temp.	Mean Hum.
St. Cloud	44.91	71 95	23 24	66 79	.....	.....	.....	.....
St. Paul	46.06	77 90	25 86	72 66	43.63	66.76	67.90	70 53
Duluth	42 76	77 60	22.16	74 06	37 26	68.50	61.13	73.20
Minneapolis	43.70	76 33	21.37	68.00	41.52	63.33	67.14	70 00
Winona	38 75	74.33	26 66	80.83	48 12	63 60	74.64	61.04
St. Peter	44.56	78 68	.....	.....	43.18	74.46	67.51	71.93
Owatonna	45.04	72.64	.....	.....	.....	.....	.....	.....
Stillwater	49.70	49 06	26.23	28 55	45 66	48.40	72.53	68.75
Moorhead	37.86	78.70	14.16	78 33	36 53	74.90	65 36	72.03
Red Wing	47 81	82.47	27.28	.....	44.18	.....	.....	.....
Rochester	47.01	67 18	25 74	65.84	44.37	63.46	67.94	72.24

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TABULAR VIEW OF MEANS.

1881 and 1882	NOV.		DEC.		JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUG.		SEPT.		OCT.		Annual Mean Temperature.	Annual Mean Humidity.
	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.	Monthly Mean Temp.	Monthly Mean Hum.				
St. Cloud..	28 63	69 81	27 02	66 19	16 30	74 05	26 41	60 13	29 68	56 01	.....	.....	53 39	61 12	62 26	66 19	.....	..	70 89	70 40	61 21	71.69	49.59	74.52	42 56	67 01
St. Paul	30 50	73 80	29 30	74 60	19 10	72 30	29 20	71 10	31 30	75 00	45 60	63.20	54 00	59 10	66 10	65.10	68.60	72 70	71 00	73.80	62.10	69 70	52.10	71.40	46 40	70.40
Duluth .	27 10	79 60	25 70	73 80	15 30	75 90	25 50	72 40	27 80	74 00	37 90	67 20	16 10	61 30	57 90	66 00	61.90	73 90	63 60	79 70	58 60	76.30	49 10	74 90	41.37	73 17
Minneap'lis	26 78	71 00	24 71	70 00	14 44	65 00	24.97	69.00	28 02	72.00	43 73	60 00	52.83	58 00	65.97	63 00	65.79	73 00	69 68	74.00	61.49	74 00	49 83	78 00	44 02	68.91
											27	ds			23 ds		26 ds		23 ds		16 ds		26 ds			
Winona	32 49	75 78	29 89	77 58	18.86	90.34	31 23	74 57	33 26	75 05	52 20	60 86	38 92	54 90	72 57	55 20	74 33	59 48	77 04	68 45	68 44	68 62	54 13	71 20	50 28	69 33
St. Peter ..	29 00	78 38	27 62	77 02	....	....	27 16	77 55	30 20	74 87	46.1	72 40	53 34	76.10	68 00	71 02	66 09	72 96	70 47	71 82	61 91	70 12	51.36	71 23	48.10	73.95
Owatonna.	28 01	66 50	26 50	62.63	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Stillwater..	31 16	32 57	29 60	68 55	9 39	24 83	28 70	32 27	29 84	36.30	47.99	48 85	39 17	60 01	70 57	68 55	70 67	66 24	76 36	69 47	69 58	68 09	45 86	61.05	49 15	49 90
Moorhead.	20 10	83 60	20 30	77 30	5 50	82.40	16.70	73.30	19 40	81.70	31.40	75 50	40 80	67.50	62.70	69 00	64 70	75 00	68 70	72 10	57 60	71.00	45 80	77.40	39 30	75.65
	28 ds	12 ds													29	ds			19	ds	26	ds				
Red Wing.	33 68	83 22	34.07	..	18 71	....	29 07	.....	31 86	....	47.24	....	53.45	....	65 72	70 48	..	....	71 82	75 72	62.70	69.44	....	....	43.83	....
Rochester..	30 55	58 38	29 75	66.43	17 72	64 58	29 76	66 53	31 73	69 22	44.92	62 58	55.48	58 58	66 13	65 64	66 89	76 94	70 81	74 16	61 30	72 59	51.64	70.68	46.47	67.13
Average of Mo'ly Me's.	24 91	70.42	27 68	64.72	16 25	68.67	26.87	66.53	29 21	68 24	35 22	64.11	53.74	62 17	65 59	66.01	67 11	71.52	71 03	72 96	62 49	71 15	51 07	72 26	45.14	68.38

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COMPARATIVE VIEW OF MONTHLY MEANS FOR SEVEN YEARS—1875-81.

	St. Cloud.		St. Paul.		Duluth.		Minne'p'lis		Winona.		St. Peter.		Owatonna.		Stillwater		Breckenridge.		Red Wing		Rochester		Moorh'd.	
	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.
									1st-15th.															
November, 1875....	23 48	70 49	25 19	68 48	23.80	70 70	22.52	67.73	26 96	60.44	26 87	71.74	24 81	59 31	.....	.....	..	.....	.....	.....	.....	.....	.....	.....
1876....	27.13	64.11	29.47	29 56	31.3	75.90	.....	.....	31 39	62.65	31 41	71 76	27 07	66 82	....	.....	18.74	71.82	.....	.....	.....	.....	.....	.....
1877....	29.31	66 41	32.40	74.40	32.80	77 90	30 37	43 89	28 days 30 56	64.60	27 19	74.92	28.81	66 20	33 88	72 96	27.00	81.80	..	.....	.....	.....	.....	...
1878....	36 39	66.73	38.30	66 20	36 70	72 50	35 97	72 00	20 ds 37 02	12 ds 77 63	37 30	78.37	35.03	63 07	39.68	63 86	32.80	79 00	.....	.....	.....	.....	.....	.....
1879....	29 33	64.14	32 60	66 50	29 90	74 00	29 91	70 20	.....	.....	31.15	70 92	30 01	62 36	94 42	37 88	26.30	77 30	33.10	69 50	31.64	73 30	.....	.....
1880...	19 40	74 68	22.20	71 40	20 00	85.70	17 54	67 00	28 ds 21.03	25 ds 78.92	...	... ...	18 58	59.74	23 69	19.15	....	.....	.....	.....	20 70	84.19	17.80	77.80
1881....	28 63	69 81	0.80	73 80	27.10	79 60	36 78	71.00	32.49	75 98	29.00	78 38	28 04	66 50	31.16	32 57	.....	.....	28 ds 33 68	12 ds 85.22	30 55	58.38	20.10	83.60
December, 1875...	22 02	70 71	25 49	78.09	24.70	71.40	22.66	79 03	27.89	.....	25 75	78 03	24 19	66.98	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1876....	1 73	57.60	8.40	69 50	10 0	61 00	4 12	58 96	6.46	35.13	7 90	66.30	6.79	45.43	20 days 6.56	85.92	0.12	66.70	.....	.....	.....	.....	.....	.....
1877....	31.76	68.07	.....	....	34 10	78.80	31 55	84.40	25 days 33 37	67.30	36.32	81 97	29.80	70 61	34 97	80.78	28.30	87 90	.....	.....	.....	.....	.....	...
1878....	21 65	68.73	19 30	74.30	17.70	75 00	15 93	72 90	29 ds 17.96	.....	15 62	69 60	13.07	57.40	20 96	60.68	10 60	83 80	.....	.....	.....	.....	.....	.....
1879....	6 84	69.91	11 90	66 80	8 20	74.10	8 29	60 50	.....	.....	3 97	43.21	8.23	47.41	15.18	20.54	3.00	98 60	.....	.....	11.18	77.84	.....	.....
1880 ...	9 75	72 09	13 90	75.70	12 90	87 80	9.07	62.40	27 ds 16.87	26 ds 80 56	10.45	73 10	10.76	52 83	14 85	22.84	.....	.....	.....	.....	12 86	91.23	.....	.....
1881....	27.02	66.19	29 30	74.60	25.70	73.90	24.71	90.00	29 89	77.58	27 62	77 02	26.56	62 03	29.60	28.55	.....	....	34.67	....	29.75	66.43	20.30	77.30

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COMPARATIVE VIEW OF MONTHLY MEANS.

		St. Cloud.		St. Paul.		Duluth.		Minne'p'lis		Winona.		St. Peter.		Owatonna.		Stillwater		Breckenridge.		Red Wing		Rochester		Moorh'd.	
		Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.
January,	1876.....	12 48	60 85	16 59	79 02	15.10	65 10	13.58	72 13	19 22	54 17	16 74	76 68	14 93	58.64	.....	.....	.....	...	...	.....	.....	.....	.....	.....
	1877.....	8 68	68 13	10 00	71 80	11.80	71.00	4.12	61 55	9.96	35 69	6 34	66 59	6 90	47.39	13.31	81 79	0.92	65.8	.....	.....	.....	.....	.....	.....
										26 da	23 ds														
	1878. ...	20 62	69 00	22 50	79 70	22 29	76.00	19 39	78 90	24.10	57.26	22 37	80 05	20 23	61.98	25.68	70 69	14.70	84.70	....	...	... ...	....	.....	...
													10 ds												
	1879.....	12 48	72 59	16.60	79.20	14 30	73 40	12 76	62 20	13 30	.....	12.60	64 61	12.36	46 52	16 05	60.01	5.20	84.80	.....	.....	... ..	....	.. ..	.....
		28 days																							
	1880.....	19 51	63 62	20.10	71.40	22 40	76 40	23.22	71 00	....	.....	24 11	64 96	24 25	63 58	26 51	51.22	11.60	95.70	....	....	26.76	84 64		.....
										25 days															
	1881.....	2 94	69 74	7 70	73 66	5 50	79 58	3 60	57.90	6 34	83.39	5.82	76.70	5 64	44.47	10 56	23 29	.. ..	....	....	....	7 03	87.21	2 60	68.70
	1882.....	16 30	74 05	19 10	72 30	15.30	75 90	14 44	65 00	18.86	90.34	.....	.....	....	.....	20 39	24 83	.....	....	18 71	.....	17.72	64.58	5 50	82 40
										25 da	16 ds														
February,	1876.....	12 02	64.97	17 40	73 30	12 20	68.9$_0$	14.57	69 61	19 97	62 50	18 68	71 35	18.08	58.85	....	...	.....	.....	.....	.. ..	.....	... .	....	.....
	1877.....	27 65	72 83	32 00	72.30	32.20	72 0$_0$	29 94	70 63	33 06	48 12	32 17	76 76	29 58	65.46	31 15	87 12	21.5	66 8	.....	.....	....	.....	.....	.....
										25	days														
	1878....	30 07	68 57	31.60	72 00	31.80	75 6$_0$	29 68	78.50	33 06	60.50	31.92	72.92	29 67	64 86	33 45	73 63	27 40	85 50	.....	.....	.....	.....	.....	.....
	1879.....	10 84	75 61	15.20	71 00	11.20	77 5$_0$	11 42	66 50	17 81	..	...	...	13 85	56 57	16.40	61.81	3 00	84 20	.....	.....	...	...	.....	.....
	1880....	14 88	63 91	20 90	65 10	15 30	72.3$_0$	17.80	62 80	.....	..	19 12	73.75	19.71	60 26	23 13	54.60	9 30	94.90	.....	.....	20 55	83 98	.....	.....
										26	days														
	1881....	13 59	62 95	17 10	72 80	15 70	79 4$_0$	13.11	63.80	16 90	78 49	13 39	65 90	13 90	62.88	19 72	15 88	.....	.....	.....	.....	15.74	92.83	6.80	74 90
	1882....	26.41	60.13	29.20	71.10	25 50	72.4$_0$	24.97	69.00	31 23	74 57	37 16	77 55	....	.....	28 70	32.27	.....	....	29 07	.....	29.76	66 53	16 70	75 30

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COMPARATIVE VIEW OF MONTHLY MEANS.

		. Cloud.		St. Paul.		Duluth.		Minn'p l's		Winona.		St. Peter.		Owaton'a		Stillwat'r		Breckenridge.		Red Wing		Rochester		Moorh'd	
		Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.
			39 ds												28 ds										
March,	1876	21.01	66.05	24.30	72.80	20.80	69 10	21.56	71.20	23 86	71 54	23.48	71.81	20.91	63.24	....	....	....	....	....	....	....	....	....	....
	1877	21 12	65.55	23.70	71.10	22.60	70.00	21.43	61.92	24 22	53.73	24 06	75.43	22.87	56.57	21.39	45.37	15.2	76.5	....	....	....	....	....	....
										6	days														
	1878	40 77	67.90	44 40	65.60	39.40	71 50	43.60	68.00	40.51	81.66	45.19	71.17	32.61	66.76	46.67	64.27	39 20	76.30	....	....	....	....	....	....
	1879	29.29	71.16	33 10	62.40	27.10	73.90	29.90	71 00	....	....	....	....	31 17	59 03	32.79	56.24	24 50	74 80	....	....	....	....	....	....
										23 ds	21 ds														
	1880	23.81	64 82	29 20	63 60	21 40	70.70	26.57	66.90	29 95	70 85	28.02	77 46	26 98	61.16	32 29	50.92	15.40	90 80	....	....	29.32	79 70	....	....
	1881	27 52	51.15	30.30	71 40	23.20	73.80	26.71	69.90	29.70	77 86	26.66	76 15	26 04	69.05	34.05	25.89	....	....	....	....	29.18	78.34	19 30	73.60
	1882	29.68	56 01	31.30	75 00	27.80	74.00	28 02	72.00	33 26	75 05	30 10	74 87	....	....	29 84	36.39	....	....	31 86	....	31.73	69 22	19 40	81.70
										26	days														
April,	1876	42 56	59 12	43 93	50 58	38 40	63 10	42 63	62.50	44 26	58 35	45 79	64.48	42 23	62.64	....	....	....	....	....	....	....	....	....	....
	1877	46 45	62 09	46.20	55.10	40 3	65.00	44 50	55.42	47 64	64 08	46 24	61.50	44 66	59 84	45 56	62.60	40.5	67.9	....	....	....	....	....	....
										23	days														
	1878	45.31	68 29	51.10	58 20	44.30	70 80	50.18	66 50	52.69	57.66	30 42	72 43	47 95	58 05	52.43	59 39	49..60	71 00	....	....	....	....	....	....
	1879	47.76	62 80	50.00	47 20	39 30	69 30	48.42	57.50	....	....	....	....	44.65	49.17	52.12	46 92	46.00	59 00	....	....	....	....	....	....
	1880	41 87	65 58	45 20	59 30	38.40	71.20	43 48	61.10	47.01	59.06	44.55	68.42	43.49	59.38	48.62	61.63	39.50	75.00	....	....	44 27	69 95	....	....
	1881	43.76	58.85	43.20	62.80	38.10	70.30	41.77	64.60	44 78	62 97	42.24	65.80	40 13	64.77	49.14	59.67	....	....	....	....	42.88	69.70	34.20	72.00
										27	days														
	1882	....	....	45.60	66 20	37.90	67.20	43.73	60.00	52.20	60.86	46.12	72.41	....	....	47 99	48.82	....	....	47.64	....	45 92	62 58	39.40	76.50

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COMPARATIVE VIEW OF MONTHLY MEANS.

	St. Cloud.		St. Paul.		Duluth.		Minne'p'lis		Winona.		St. Peter.		Owatonna.		Stillwater		Breckenridge.		Red Wing		Rochester		Moorh'd.	
	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.
May, 1876	58 57	60 78	59 16	58.99	48.70	65 20	58 03	62.65	60 38	24 days 61 45	59.89	64.53	57.86	64.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1877	60.91	57.90	62 08	52.60	50.7	68.00	60.01	60 02	66 05	58.12	51.69	66 32	58.73	57.91	61.54	62.03	58.4	64.1	.....	.....	.....	.....	.....	.....
1878	52.24	71 15	55 10	56 70	49 50	64 70	53 09	64 00	57 16	13 days 55.43	54 30	68 38	52.61	60.63	55 39	58.60	51.20	69.20	.....	.....	.....	.....	.....	.....
1879	57.16	70.72	63 30	63 30	48 50	75.20	57 72	66 00	.....	.....	.....	.....	58.59	61.09	62 14	59.75	55 50	69 40	.....	.....	.....	.....	.....	.....
1880	62.37	65.58	63 10	61 60	51 20	75.70	62 29	62.70	68 19	57 47	63.62	57.48	62.14	58 65	67.59	64.51	60.30	65.20	.....	.....	62.88	63.15	.....	.....
1881	63 24	65 26	63 80	66 60	51.10	74.00	63 25	68.90	67 94	62 86	63 81	68 51	62.40	63.07	69.59	57.96	.....	.....	.....	.....	63.69	65.38	60.70	67.20
1882	53 39	61 12	54 00	59.10	6 10	64 30	52 83	58 00	58 92	27 days 54 90	53.34	76.10	.....	.....	59.17	60.01	.....	.....	53 45	.....	55.48	58 58	50.80	67.80
June, 1876	64 85	64 82	66 27	65 09	55.10	72.00	64.44	70 64	68.69	68 90	67 02	69.75	63.89	69 76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1877	62 46	64.70	63 70	63 70	56.6	73 00	61.92	71.55	67.18	15 days 66 91	63 15	64.41	58.59	68.88	59 05	65.34	58 9	83 3	.....	.....	.....	.....	.....	.....
1878	65.40	70 54	66 60	69 00	60 20	72 20	64 23	71 60	69.16	23 days 66.42	66 43	78.45	63.84	69.82	66 65	68.04	64 90	75 20	.....	.....	.....	.....	.....	.....
1879	64.71	71 07	67 90	64 00	59 90	68 80	66.67	67 20	.....	.....	.....	.....	65 75	69.21	72.13	66.41	65 40	67.70	.....	.....	.....	.....	.....	.....
1880	66 83	71.80	68 00	67.70	59 70	80.60	67 32	70 50	71 77	71 80	68.47	73.91	66 70	73 82	72 86	65 05	65.50	75.30	.....	.....	67.47	74.79	.....	.....
1881	66 96	60 76	67 00	70 70	56 90	73 90	66.87	73.20	67.85	12 days 71 07	67.69	74 63	66.31	72.05	71.11	61.14	.....	.....	69.23	23 days 73 09	67 24	74.74	65 80	71 40
1882	62.26	66.19	66.10	65.10	57.90	66 00	65 97	63.00	73.57	23 days 55 20	66.00	71.02	.....	.....	70.57	68.55	.....	.....	65 72	29 days 70.98	66.13	65.64	62.70	69 00

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COMPARATIVE VIEW OF MONTHLY MEANS.

		St. Cloud.		St. Paul.		Duluth.		Minne' p'lis		Winona.		St. Peter.		Owatonna.		Stillwater		Breckenridge.		Red Wing		Rochester		Moorhe'd	
		Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature	Monthly Mean Humidity.
July,	1876.....	72.25	63 26	73 46	65 30	64 90	70 00	72 70	71 21	78.15	62 45	74 54	68 21	71.32	70 20	....	....	....	....	....	....	....	....	....	....
	1877	71 9	65.74	73.60	62 10	68.1	70.00	71.72	67.74	78 01	69 09	74.81	73.24	72 62	68.01	70.69	66.74	69.5	71.10	.....	.....	.....	.....	.....	.....
	1878	72.58	76 41	73 70	72 90	70 80	69 80	72 23	77 10	72.15	69.76	74 52	79.16	71.53	73.79	74 46	69 63	70 70	74 70	.....	.....	.....	.....	.....	.....
	1879	71 19	72 64	73 50	68 40	67 89	72 10	72 42	74 00	.....	.....	.....	.....	71 84	73 08	76 7:	70 18	70 88	71 70	.....	.....	.....	.....	.....	.....
	1880	70 34	66 00	71.00	71 00	65.00	69.00	70 90	70 20	74.47	66.55	71 59	71 59	69.90	70 0.	76 59	63.57	69.70	69 40	71 60	71 89	70.23	74 34	.....	.....
	1881.....	73 75	69.31	72 60	72.60	70.50	63 60	72.32	75 70	.....	.....	71.82	77 70	71.90	73.15	78.27	63.36	... .	.....	72.76	72.54	73 19	73 08	71.20	59.10
	1882.....	.....	....	66 60	72.70	61.90	73 90	65.79	73 00	74 33	59.48	66 06	72.96	.....	... .	70.67	68.24	.....	.....	.....	.....	66.89	76.94	64.70	75.00
August,	1876.....	69.38	67 63	69 90	71 80	65 50	71 00	69 53	75 87	75 01	69 72	74 63	75 06	68 39	74 69	...	....	....	.....	.....	.....	.....	....	....	....
	1877.....	70.65	62 19	74.20	55.80	69 2	65 3	70 09	64 38	72 21	63.57	72.47	65.30	62 65	63.00	63.19	63 37	65.90	71.20	.....	.....	.....	.....	.....	.....
	1878.....	70 96	73 41	72 60	68 30	70 50	64 10	70.45	73 60	72.99	65.98	71.33	75.43	65 63	68.04	72.52	68.40	68 70	75 30	.....	.....	.....	.....	.....	.....
	1879.....	67.85	71.38	70 20	67.90	67 10	67.80	69.23	71.80	.....	.....	.....	....	68.46	73.38	73.95	69.07	66.50	73.80	69.67	72 17	69.14	67 40	.....	.....
	1880.....	67 59	69 8s	69.50	68 50	64 00	73 80	68 51	77 30	21 93	66.54	69 73	71.23	67 94	69 55	74.34	53.92	64 80	73.40	67.45	73 25	69 55	67.71	...	.....
	1881.....	72.12	70 38	72 90	82.70	67.00	79.30	72.27	75.30	.....	...	74 04	79.18	72 64	70.40	77.70	61.85	.....	....	73 49	73.02	71.18	70.49	68.40	59 80
	1882.....	70.89	70.40	71.00	73.80	63.60	79.70	69 68	74 00	77.01	68.45	70.47	71.82	.....	.....	76 36	69.47	... .	.....	71.82	75.72	70.81	74.16	68.70	72.10

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COMPARATIVE VIEW OF MONTHLY MEANS.

		St. Cloud.		St, Paul.		Duluth.		Minne'p'lis		Winona.		St. Peter.		Owatonna.		Stillwater		Breckenridge.		Red Wing		Rochester		Moorh'd.	
		Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.
September,	1876....	56.41	70 98	56.80	15.90	43.50	70.00	56.86	84.46	59.61	77.16	57.98	79.78	56.32	74.85	. .	.....	.....	.....	.....	.. ..	.....	.....	.....	.....
										17 days															
	1877....	62.66	77.80	64.00	66.6	59.1	73.3	62.00	71.3	65 79	66 69	65.66	72.54	62.6	66.8	64 90	66.86	65.85	69.00	.....	....	.....	.....	.....	.....
										23 days															
	1878...	58 99	70 98	60.60	67.40	57 30	73 80	59 27	73.90	60.50	72 96	57.80	74.73	57.84	70.36	61.26	65 37	54.70	70 40	.....	.....	.....	.....	.....	.....
	1879....	54.46	67.09	57.10	65.50	54.10	71.80	55.57	76 40	...	.....	56.84	72.51	55 43	66.01	64 69	64 64	52 90	16.50	57.40	72.60	56.99	66.88	.....	.....
										29 days															
	1880....	57.78	66.99	53.90	64.60	54.90	67.10	57.81	69.40	61.56	69.30	58.52	71.46	57 22	65 05	64.89	49 94	54.10	70.00	67 75	74 82	58 17	85.31	....	.....
																				29 days					
	1881...	58.17	74.65	59.30	83.30	55.90	79.80	58 07	80 00	.....	.....	58.71	81.48	59 59	76.02	64.69	59.32	.....	.....	60 88	80 61	61.21	75 80	52.20	77.40
										16 days										20 days					
	1882....	61.21	71.69	62.10	69 70	58.60	76.30	61.99	74.00	68.44	58.62	61.91	70.12	.....	....	69.58	68 08	.....	.....	62 70	69.44	61 30	72 59	57.60	71.00
October,	1876...	43.12	63 80	43 20	64.80	41 70	65.00	44.43	72 78	46 68	61 76	43 41	70 36	42 50	60 89	. . .	. . .	.....	.....	.....	.....	.....	.....	... .	....
	1877 .	40 9	70 15	46 72	70 6	45.5	76.7	42.6	76 6	47.24	46.51	46 06	44 11	46 01	46 51	47 83	69 94	41.9	72.50	....	.....	.....	.....	.....	.....
	1878....	44 80	67.98	46 30	62 30	42 80	70 80	44 10	70.50	. ..	.....	45.01	69 46	44.10	61 57	48.20	57.3	39 90	69.00	.....	....	.....	.....	.....	....
	1879....	54 70	68 51	57.20	81.40	50 80	73 80	56 09	66 80	.....	.....	56.79	69.74	55.13	63.61	60 40	61.68	53.30	61 50	57.50	68 90	52 90	67 00	....	.....
	1880 ..	44 83	65 81	45.70	63.00	43.30	74 00	43 26	70.90	46.06	64.27	. .	....	47 19	58.11	52 23	47.3	42.20	70 40	44.85	71 71	45 09	68.34	.....	.....
										24 days		30 days								20 days					
	1881 ..	47.91	71.39	48.40	76 60	45.30	73.40	46.25	78.00	45.02	72 88	45 99	76.19	47.51	75.40	53.26	55.37	....	.....	48.88	81.60	49.28	81.60	40.30	75 10
										26 days															
	1882	49 89	74.52	52 10	71 40	49 10	74.90	49.83	78.00	54.13	71.20	51 36	71.23	.....	.....	55.86	61.05	....	.....	....	.....	51.64	70.18	45.80	77.40

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TABULAR VIEW OF AVERAGE OF MONTHLY MEANS, 1875-'82.

	Nov. Average.		Decemb'r Average.		January Average.		February Average.		March Average.		April Average.		May Average.		June Average.		July Average.		August Average.		Sept. Average.		October Average.	
	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.	Monthly Mean Temperature.	Monthly Mean Humidity.
1875 and 1876	24.73	66.77	24.67	74.04	15.52	65 92	16 13	67.07	22.70	69.39	42.83	60.97	57.51	62.52	61.32	68 71	72.46	67.23	70.34	72.34	55.25	76 16	43.58	65.58
1876 and 1877.....	18.74	71.82	6.23	60.67	8.00	63 41	29.91	70.21	21.84	64 01	44.67	61.95	58.90	60 71	61.28	69 08	72.33	68.19	68.66	63.81	72.80	70.19	44.92	62.67
1877 and 1878.....	30.25	69.28	32 52	77.49	21.24	73 30	30.91	72.45	41.37	70.35	46.88	64 70	53.39	66.53	65.26	72.39	71.48	73 69	70 56	70.28	58.69	71 54	48 80	66.11
1878 and 1879.....	36.57	71.04	17.12	70.22	12.85	68 66	12.42	69.88	29.60	66.93	46.89	55.96	57.55	66.49	66.12	67.77	72.03	71 72	69.12	70.80	36.54	68.99	55.48	66.27
1879 and 1880.....	30.83	66.61	8.26	62.10	22.05	71.89	17.85	70.17	26.29	69.69	41 38	64.86	59 31	63.20	66.46	72.52	71.12	69.41	68.66	70.61	59.59	68 36	45.47	65.36
1880 and 1881.....	20.07	68.73	12.37	68.69	5.25	66 45	14.59	66.98	27.76	66.71	41.82	62.94	62 95	65.97	66 63	71.42	72.83	70.01	72 17	72.24	58.97	77.83	47.10	73.02
1881 and 1882.....	28.91	70.42	27.68	64.72	16 25	68.67	26 87	66.53	29.20	68.24	35.22	64.19	53.74	62.17	65.59	66 01	67.11	71.56	71.03	72.96	62 49	71.15	51 07	72.26

TABULAR VIEW OF AVERAGES OF ANNUAL MEANS.

	1875 and 1876	1876 and 1877.	1877 and 1878.	1878 and 1879.	1879 and 1880.	1880 and 1881.	1881 and 1882.
Annual Mean Temperature.....	42.50	43.73	48.25	43.54	45.90	42.02	45.14
Annual Mean Humidity.....	68.06	66.67	69.81	67.66	67.95	68.51	68.38

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THE SANITARY
WATER SURVEY
OF THE STATE.

CHEMICAL ANALYSIS OF WATERS FROM LAKES, RIVERS, SPRINGS, WELLS, AND CISTERNS, MADE IN THE LABORATORY OF THE STATE BOARD OF HEALTH.

1881—1882.

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As heretofore, the following analyses have most of them been made at the request of parties wishing to know the sanitary condition of their water supply, and though wells known by this and other evidence to be bad have been excluded in the averages, still those averages for wells "not markedly polluted," is not a fair average of wells entirely free of "organic" impurities, meaning thereby impurities other than of vegetable and mineral origin. A brief *resume* of the results will be found after the following statistics:

The top line, after each name, gives parts per million and the next grains per American gallon.

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ANALYSES

Made in the Laboratory of the Board at Red Wing.

In each case the first line denotes parts per million (milligrammes per liter), the second line shows grains per American gallon (weighing 58372.2 grains).

	Date of Analysis.	Total Solids.	Destructible Matter.	Free NH3	Alb. NH3	Chlorine.	Nitrates.
WELLS.							
1. Red Wing	July 25, 81	430.	40.	.24	12	78	trace.
Artesian, at depot		25 18	2 33	.014	.007	4.09	
2. Owatonna	July 30, 81	430.	70.	.16	08	10.	
Public park		25.14	3 39	.0097	.0048	.58	
3. Wastedo	Sept. 3, 81	.....	.....	.....	... ...	11.	trace.
T. Larson's well		.....	.....	.....	.....	.64	
4. Tintah	Oct. 3, 81	780.	120.	60	.24	22.	
T. B. Marke's well		45.61	7 01	.035	.014	1.28	
5. Tintah	Oct. 3, 81	740.	100.	.92	.20	24.	
Hotel		43 27	5 84	.053	.0116	1 4	
6. Farmington	Nov. 8, 81	560.	160.	.88	.39	.22	trace.
No. 1, L. P. Dodge, M. D		32 7	9 34	.051	.0227	1.28	
7. Farmington	Nov, 10, 81	340	70	.08	.12	8	trace.
L. P. Dodge		19.85	4.088	.0046	.007	.467	
8. Farmington	Nov, 10, 81	400	80.	.12	08	20.	trace.
L. P. Dodge		23 36	4 67	.007	.0046	1.16	
9. Farmington	Nov. 10, 81	350.	70	.10	.12	10.	trace.
L. P. Dodge		20 44	4 08	.0058	.007	.584	
10. Farmington		540.	60	08	.12	32.	trace.
L. P. Dodge		31 54	3 50	.0046	.007	1.86	
11. Farmington	Nov. 12, 81	370	70.	066	.08	8.	trace.
L. P. Dodge		21 02	4 088	.0038	.0046	.467	
12. Duluth	Dec. 16, 81	360.	100.	.49	.98	10.	trace.
C. B. Smith's well		21.02	5 84	.028	.057	.58	
13. Minneapolis	Dec. 16, 81	900	200.	.15	.10	76.	trace.
1321 9th st. s.		52 56	11 68	.0087	.0058	4.439	
14. Minneapolis	Dec. 17, 81	360	1 20	.08	.12	36.	trace.
333 4th st. s.		21.02	7.	.0046	.007	2 1	
15. Minneapolis	Dec. 17, 81	460	180.	.20	.24	80.	trace.
245 7th ave s.		26 86	10.51	.011	.014	4 67	
16. Minneapolis	Dec. 17, 81	910.	180.	.10	.20	190.	trace.
119 2d st. n		53.15	10.51	.0058	.0116	11.09	
17. Minneapolis	Dec. 19, 81	1200.	200.	.16	.10	140	trace.
529 1st st. n.		70 09	11.68	.0093	.0011	8.17	
18. Minneapolis	Dec. 19, 81	360	120.	.15	.12	36.	trace.
45 8th st. s		21.02	7.	.0087	.0021	2 10	
19. Faribault	Jan. 26, 82	380.	100.	.22	18	20.	
St. Mary well		22 19	5.84	.028	.0155	1.16	
20. Lyle	Feb. 2, 82	260.	70	.15	.10	36.	trace.
W. Stanley & Son		15.18	7 08	.0087	.0058	2.10	
21. Minneapolis	Feb. 7, 82	800	100.	16	.18	40.	trace.
Nic. ave, 9th st.		46 72	5.84	.0093	.0105	2.33	
22. Minneapolis	Feb. 7, 82	440.	120.	.14	.12	20.	trace.
Nic. ave. 9th st		25 7	7.	.008	.007	1.16	
23. Pine City	Mar. 1, 82	180.	40.	.10	.08	40.	trace.
Lake View House		10 50	2 33	.0058	.0046	2.33	
24. Red Wing	Mar. 4, 82	980.	180.	.12	.08	24.	trace.
S. B Stevens' well		57.24	10.51	.007	.0046	1.4	
25. Minneapolis	Apr. 4, 82	560.	130.	.12	.18	60	trace.
Winthrop school		32 70	7 59	.007	0105	3 5	
26. Minneapolis	Apr. 4, 82	780.	150.	1.06	36	68.	trace.
900 Hennepin ave		45 56	8 76	.0619	.021	3.97	
27. Minneapolis	Apr. 7, 82	300.	75.	.....	.....	13.	
Artesian, Sum'r sch'l		17 52	4 38	.....	.....	.759	
28. Hokah	Apr. 8, 82	130	29.	.12	.14	14.	trace.
S. C. White's well		7.59	1.69	.007	.0081	.964	
29. Red Wing	Apr. 8, 82	120	20.	.14	.12	8	trace.
Seminary		7.	1.16	.008	.007	46.	
30. Aberdeen, D. T	May 3, 82	1128.	280.	.....	.....	332.	
Artesian, 906 feet		65 88	16 93	.....	.....	20.70	

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ANALYSES.—Continued.

	Date of Analysis.	Total Solids.	Destructible Matter.	Free NH3.	Alb. NH3.	Chlorine.	Nitrates.
WELLS.—Continued.							
31. Pleasant Grove	May 10, 82	200.	40.	.053	.046	28.	trace.
Hotel		11.68	2.33	.003	.0028	1.63	
32. Pleasant Grove	May 13, 82	400.	80.	.10	.18	100.	trace.
A. V. Russell's well		23 36	4.67	.0058	.0105	5.84	
33. Pleasant Grove	May 15, 82	190.	30.	.04	.06	18.	
Mr. Beardley's well		11.09	1.75	.0023	.0035	1.05	
34. Minneapolis	June 2, 82	380.	.105	.10	.13	20.	trace.
Southwest part		22.19	6.13	.0058	.0075	1.16	
35. St. Peter	June 26, 82	546.	110.	.14	.21	7.14	
Hospital for Insane		38.2	7.7	.0084	.0127	.5	
36. Minneapolis, 1st Ave.	July 10, 82	1258.5	441 4	.013	.40	67.	trace.
S. bet. 8th and 9th sts		88.	30.	.0009	.028	4.7	
37. Albert Lea	Aug. 4, 82	1101	655.	.018	.15	75.7	
Geo. Crain's well		77.	45 9	.0013	.0105	5.3	
38. Pine Island	Oct. 17, 82	395.	120.	.....	.....	18.5	trace.
80 ft. from Zumbro riv		27.7	8.4	.....	.....	1.3	
39. Pine Island	Oct. 19, 82	794.	428.	.....	.....	147.	trace.
L. P. Fowler's well		56.6	30.	.....	.....	10.3	
40. Pine Island	Oct. 19, 82	651.	400.	.....	.....	51.	trace.
W. W Jewell's well		45.6	28.	.....	.....	3.6	
41. Pine Island	Oct. 19, 82	201.	157.	.....	.....	45.7	trace.
Scott Fleming's well		14.1	11.	.....	.....	3.2	
42. Kenyon	Oct. 19, 82	222.	107.	.016	.024	3.5	trace.
M. O. Bockman		15.6	7.5	.00112	.00158	25	
43. Faribault	Nov. 1, 82	464.	287.	.012	.042	15.7	trace.
Geo. B. Whipple's well		32.5	14.5	.00084	.0029	1.1	
44. Faribault	Nov. 1, 82	552.	242.	.008	.053	20.	trace.
Geo. B. Whipple		38.	17.	.00056	.0037	1.16	
45. Red Wing	Nov. 6, 82	428.	164.	.008	.019	14.2	trace.
Main street		30.	11.5	.00058	.00133	.1	
RIVERS.							
1. Red Wing, Miss. R	Oct. 4, 81	240.	80.	.10	.24	4.	
at Red Wing Ferry		14.03	4.67	.0058	.014	.23	
2. Red Wing, Miss. R	Oct. 5, 81	200.	50.	.10	.27	6.	
below Red Wing		11 68	2.92	.0058	.0157	.35	
3. Minneapolis	Dec. 20, 81	260.	80.	.18	.20	16.	trace.
City Water Works		15 18	4.67	.0105	.0116	.58	
4. Pine City	Mar. 1, 82	200.	100.	.21	.20	10.	trace.
Snake River opposite		11.68	5.84	.0122	.0116	.584	
SPRINGS.							
1. Cloquet. [McEven	May 6, 82	90.	22.	.08	.10	8.	
At house of O. M.		5.25	1.28	.0046	.0058	.467	
2. Cloquet	May 6, 82	80.	20.	.08	.12	6.	
O. M. McEven		4.67	1.16	.0046	.007	.35	
CISTERNS.							
1. Minneapolis	Apr. 5, 82	600.	120.	2.8	1.15	20.	
900 Hennepin ave		35.04	7.	.163	.067	1.16	
Average of wells		380.	62.	.115	.10	12.	
Not mineral nor markedly polluted.		22.222	3.625	.006	.005	.701	
Average of artesian		605.	113.	.35	.16	100.	
Five wells		35.380	6.608	.020	.009	5.848	
Average of 2 springs		85.	21.	.08	.11	7.	
		4.970	1.228	.004	.006	.409	
Average of 4 rivers		225.	78.	.15	.22	8.	
		13.148	4.561	.008	.012	.467	

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Average of Wells where more than one Analysis has been made for a place.

	Total Solids.	Destructible Matter.	Free NH3	Alb. NH3	Chlorine
Faribault, 3 wells	465.	209.	.08	.091	18.5
	30 89	12.44	.001	.0071	1.14
Farmington, 6 wells	410.	85.	.221	.15	16.6
	24 81	4.79	.0128	.0088	.969
Minneapolis, 13 wells	669.8	163.	.202	.17	.65
	40.23	9 85	.0115	.0105	4.
Pleasant Greve, 3 wells	263.	50.	.064	.095	82.
	15 37	2 91	.0037	.0056	2.84
Pine Island, 4 wells	510.	278.	.....	.....	85 5
	38.	19 3	.....	.....	4.6
Red Wing, 4 wells	489.	101.	.127	.084	29.
	29.85	8 39	00739	.0049	1.75
Tintah, 2 wells	760.	110.	.76	.22	23.
	44.44	6 42	.044	.0128	1.34

Flowing Wells.

	Free Am.	Alb. Am.	Total Solids.	Destructible Matter.	Chlorine
Flowing well, Mankato, parts per mill.	.36	.26	500.	80.	2.
Grains per gallon	.0794	.0152	29.1861	4.6697	.1167
Flowing well, Minneapolis	.20	.18	288.	128.	2.5
	.0116	.0105	16.8112	7.4716	.1459
Flowing well, Winnebago City	.56	.16	932.	132.	4.
	.0327	.0093	54.4029	7 7051	.2335
Flowing well, Tintah	.60	.24	780.	120.	22.
	.035	.014	45.6134	7.0176	1.2865
Flowing well, Owatonna	.16	.08	430.	70.	10.
	.0097	.0048	25.1461	3 2936	.5848
Flowing well, Red Wing	.22	.12	390.	50.	65.
	0128	.007	22.8072	2.9240	3.8012
Average pts. per mill	.36	.17	553.	97.	17.6
Grains per American gal	.0285	.0101	32.3280	5.5302	1.0281
Average of examinations of artesian well at depot, Red Wing :					
Parts per mill	.17	.08	386.6	57.	61.7
Grains per American gal	.0145	.005	22.6000	3.3079	3.6680

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TYPHOID FEVER.

Complaints coming to the office of the State Board of Health as to the prevalence of typhoid fever in Minneapolis, the Secretary asked of Dr. J. H. Salisbury, City Physician and Health Officer, a statement of the facts. In answer to questions proposed Dr. Salisbury promptly replied as follows:

MINNEAPOLIS, MINN., March 17, 1882.

C. N. Hewitt. M. D., Secretary State Board of Health:

MY DEAR DOCTOR—Yours of yesterday is at hand and contents noted. My monthly reports have been sent you regularly. That for February is still in the hands of the printer. Your questions I will answer to the best of my ability, but it will be only an estimate in several cases. As to your first question, "How many cases now in the city?" As you know, about the first of September, we secured a report of the number of cases then under treatment by each physician, or endeavored to do so. The total number so reported was 247. The deaths for August from typhoid fever, was forty-six; for September forty-one; the average for the two months was forty-three. This would give one death to about six cases. There were seventeen deaths in February. If the same ratio exists it would give us 102 cases the first of March. There were more cases in September than were reported, and I feel positive that there are more than this estimate gives; now surely there is not more than one death to ten cases. I have made some effort to obtain the ratio of deaths to cases. One physician who has a large practice, has had 160 cases during the year with one death. Another had sixty cases with one death, and then lost five cases in succession, making his ratio one to ten instead of one to sixty. In my city practice in the hospitals, I have had 202 cases with thirty-nine deaths, about one to six, while in my private practice, I have had at least 150 cases, with but one death. Taking all classes together, I think that one to ten would not be far from right. This would give us 170 for the month of February, and as four weeks is about the average length of time which each case is attended, it would give us the same number the first of March. The disease is undoubtedly increased since that time.

2d.	September,	total deaths	129,	from	typhoid fever	41	per cent.
	October,	" "	135,	"	" "	60	"
	November	" "	114,	"	" "	32	"
	December,	" "	110,	"	" "	14	"
	January,	" "	93,	"	" "	8	"
	February,	" "	100,	"	" "	17	"

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3d. What measures are your board taking to stay the disease? As a board, none. All I can do is to see the members individually and consult with them, but no extraordinary measures are being taken at present. Of course our inspectors are at work cleaning up as rapidly as they can. During the fall I assumed the right as health officer to remove all cases occurring in boarding houses or crowded houses. But when the disease began to subside, the committee from the city council who act as poor commissioners, thinking, I suppose, that the hospital bills were too large, suggested that hereafter no patient be removed until after an investigation by the superintendent of the poor, and not then unless he was found destitute. I am doing what I can in the way of removal of filth, disinfection, etc. I have thought of isolation, but have not attempted it. What do you think? Would it do good if enforced, and could it be enforced?

4th. "What aid do the profession give?" None.

5th. "Is the disease more prevalent now than heretofore?" More than it was in December and January. Not so much as in August, September, October and November.

6th. "What will be the effect of the spring break up?" I look for a still greater prevalence of the disease.

Now Doctor, while I am deeply interested in this subject. I am utterly discouraged. Two years ago I worked faithfully to avert the calamity which now afflicts us. And now what can we do? What can the State board of Health do ? Something perhaps, but not much. Every foot of our soil is saturated with filth. The entire city is one vast hot bed for the propagation of disease germs, and the seed has been scattered broadcast. I see no help for the present. We must endure it for a year or two at least. I shall be thankful for anything you can do to help us. Either in the way of advice or suggestion or by some official action. If you could induce our city fathers to prohibit the use of open privy vaults and cesspools; to extend the water system over the entire city, and provide free hydrants and compel people to close their wells; to elect a Health Officer (you know we have none now I am city physician) with a salary sufficient to enable him to spend at least half of his time in the duties of his office; to give him inspectors enough to make a sanitary inspection of every house in the city four times a year, and do a thousand other things which I could suggest had I time; in fact to treat the health department as if it was the most important department of the city, as it is, instead of of ignoring it, as they do, I should look for a better state of things in two years.

Yours Respectfully,

A. H. SALISBURY.

To this the secretary of the State Board of Health replied, suggesting 1st That as far as possible the *location* of the disease be ascertained and that steps be taken to secure the disinfection of all typhoid discharges, by concentrated solution of sulphate of iron in

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the receptacle used. That to this end the co-operation of all physicians, nurses and of heads of families be asked. The attempt to remove the causes at the begining of the outbreak was faithfully made by the mayor and Dr. Salisbury acting in concert. So far as permitted its effect was to diminish the number of cases and the severity of the attacks. Had their plans been carried out there is little doubt that the disease would have sooner yielded. The most painful fact in the above statement is the lack of cordial co-operation on the part of medical men with the Health Officer. His duty was most trying and discouraging. The statement is published as a part of the history of sanitary work in our state.

It is but just to state that the rapid growth of the population of Minneapolis and the temporary and inadequate supply of tenement houses, the impossibility of making the water supply and sewer system keep pace with the necessity for them, explains much of the prevalence of typhoid fever to which this and the following paper relates. At the coming session of the legislature permission will undoubtedly be given for raising the necessary funds for water supply and sewers. Meantime no necessary expense should be spared to reduce the evils of open cesspools and unfiltrated wells to a minimum.

REPORT BY DR. J. C. COCKBURN, HEALTH OFFICER OF MINNEAPOLIS, ON TYPHOID FEVER.

Deaths from typhoid fever in Minneapolis from August, 1881, to December 1882.

	DEATHS.		DEATHS.
August	42	May	19
September	42	June	6
October	60	July	8
November	32	August	14
December	13	September	27
January, 1882	7	October	19
February	14	November	24
March	19	December	6
April	27		

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The above table has been prepared from the time when typhoid fever was declared epidemic, though it had prevailed alarmingly the month previous.

During October the mortality reached the zenith and dwindled down as the cold months advanced till February, when it took a grave aspect again. At this time a new phase presented itself. During the summer and autumn the poorer classes and those more exposed were the more frequent victims, while in February and March the more comfortable and well to do class suffered most, and the type of disease was more severe and more deaths occurred in proportion to number of cases than in the previous season. From this time to the hot summer months the number of cases became much less and milder in type. During months of July, August, September and October the disease was pretty severe, the number much less than the year previous. And in November though there were quite a number of deaths, yet most of them were from cases which occurred in September and October.

At the present writing only six deaths have occurred in the month and those mostly from cases coming down the month previous. Just now but few cases exist in the city and the hospitals have only a scattering case.

The effect of the past epidemic of typhoid on the sanitary condition of the city is such that only great care on the part of health officials and support of people with local and state legislation to back them, will be able to prevent perhaps a worse condition than that of 1881. The necessity of ventilation or of open air for fever patients is not enough urged on the family, and the necessity of disinfectants for the room; and these subjects are not often spoken of by the attendant physician. Perhaps it may be mentioned that the vessels of a sick bed should be kept clean, but disinfection to prevent the spread of the disease by the excreta is not mentioned, and the contents of the bed vessels are thrown on the ground, in privy or water closets to convey to some other the foul germs of disease.

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How are we to overcome this? It cannot be done while physicians are not earnest sanitarians and treat instead of prevent disease, and families know nothing of sanitary law and hygiene. The first obstacle we cannot overcome unless the oriental custom of paying a physician, while in health and killing the doctor if any one becomes sick, is adopted. This custom would create a great slaughter of medical men, but there would in the end be less deaths from preventable diseases. The last named difficulty can be remedied by making the study of health and hygiene compulsory in all schools. Not merely a study of physiology and application of the knowledge to the preservation of health, but a practical knowledge of the means of preventing disease. How to prevent spread of contagion, how to disinfect infection, and these to be taught on a scientific as well as popular basis. The study being made compulsory then teachers should be examined by competent sanitarians as to their fitness to teach the same.

J. C. COCKBURN, M. D.

DIPHTHERIA.

By Dr. J. C. Cockburn, Health Officer, Minneapolis, Minnesota.

Diphtheria reported and deaths from the disease from April to December, 1882 inclusive:

MONTHS.	No. Report'd	Deaths.	WARDS.	Deaths by Wards.
April	1	8	First	6
May	2	5	Second	17
June	10	6	Third	7
July	9	8	Fourth	6
August	13	9	Fifth	9
September	4	9	Sixth	43
October	22	8		
November	23	25		
December	28	10		

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The number reported, 112, does not include all cases which did exist, as 88 deaths out of 112 cases would be a frightful mortality. Great difficulty existed in getting physicians to report their cases, so that quarantine could be established, and no effort has really been made by physicians to stay the spread of the disease. Cannot learn that ever any separation of members of families from the one affected with the disease has been done. Nor have public funerals been discouraged by attending physicians, as a rule. While there is any less fear of diphtheria than there is of small pox no great effort will be made by physicians to stay this spread. Unless stringent legislation be enacted and enforced, we cannot do much at staying diphtheria. The past five months physicians have reported cases more promptly, but the numbers for November show that all is not right during that month. December shows best and gives us some hopes that an endeavor is being made to report cases as they ought to be. By looking over the table showing deaths by wards it will be seen that the largest number of deaths have been in the 6th ward, and here the most crowded habitations are found, poorest ventilation and most filthy surroundings. The ward with the next largest numbers of deaths is the 2nd ward and here nearly an opposite condition to the sixth is found, yet diphtheria has here exceeded other parts of the city. Crowded rooms are not common in this ward, but public funerals have been more the rule than in any other part of the city, and another thing, while surroundings are apparently clean, many large privy vaults have gone from year to year without cleaning. And again a large portion of this ward is intersected by a creek, which drains a marsh and large tract of country without the thickly populated part of the city, and this tract and marsh has been used by lawless scavengers as a dumping ground for night soil and all sorts of garbage. The inhabitants of the 2nd ward reap the ill-effect of all this filth washed back to them by fall rains and summer showers, a necessity for a separate or different system of health inspection and the legislation necessary for effecting such system.

J. C. COCKBURN, M. D.

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REPORT ON TRICHINOSIS.

Jan. 25, 1882. Notice received from Dr. J. W. Andrews of Marshall, Lyon Co., of an outbreak of trichinosis at Minneota, same county; answered same date, by Secretary giving instructions for post mortem examinations and collection of samples in suspected pork. A detailed statement was asked for.

Jan. 31. At an inquest held on the body of one of the victims the Secretary assisted Drs. Parsons, Andrews, Berry and others and made the microscopic examination of specimens taken from the body, trichinae free and partially encysted were found in all the voluntary muscles examined. The attached account of the outbreak is taken from Dr. Parsons' report to the State Medical Society. No formal report was made to this board. In February the following report was made to the health officer of Minneota, by the Secretary State Board of Health:

RED WING, February 5, 1882.

Dr. Parsons, Health Officer, Minneota:

DEAR DOCTOR—I received last night by mail a package of samples of pork numbered from I to XX, and a piece of pork marked received by G. A. J. I have examined (with the microscope) at least six pieces from each sample, some more, none less, and I find as follows:

No. 1. *Shoulder.* Three sections showed an average of two trichinæ in each "field."
No. 14. *Shoulder.* Trichinæ in two out of three sections.
No. 7. *Shoulder.* Indications gave trichinæ in eight.
No. 4. *Shoulder.* Three sections out of nine gave trichinæ.
No. 11. *Shoulder.* Five out of six sections gave trichinæ,
No. 12. *Shoulder.* Four out of eight sections gave trichinæ.
No. 6. *Shoulder.* Two out of nine sections gave trichinæ.
All the remainder though carefully searched was free from trichinæ.

(These samples are understood to be from the village butcher's shop, hence the following direction.)

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Of course you will forbid the use of the meat from which Nos. I, IV, VI, VII, XI, XII, XIV, were taken. Continue the collection of samples, and don't fail to send samples taken from cats, rats, mice, squirrels or other animals in any way likely to have been food for the pigs. * * * * *

C. N. HEWITT.

Notice was given in the daily papers that all samples of pork sent to the laboratory of the State Board of Health, at Red Wing, would be examined and reported on.

A very large number of samples came in from all over the state but fortunately none gave evidence of the infection, except as above described. Samples taken from rats in the infected district, though carefully examined, failed to exhibit the parasite. Dr. B. Carl's report describes the only case outside of Minneota.

EXCERPTS FROM DR. PARSON'S REPORT TO STATE MEDICAL SOCIETY.

January 19th, 1882, was called to Minneota to see Dr. Sanderson, age forty. Found the doctor sitting in a chair troubled with a severe cough, respiration labored, ankles œdematous, abdomen tympanitic and a profuse diarrhœa, pulse 130, temperature 103½, appetite poor, disagreeable taste in the mouth, complaining much of stiffness. Took the history of the case making as thorough an examination as possible; thought best to reserve my diagnosis until morning. The doctor told me there was a young man, a patient of his, two blocks up the street, whom he wished me to see. I found this man to be a German, twenty-four years of age, by name William Kushner. His sickness dated from Christmas. Had been treated for typhoid fever by the attending physician, pulse 120, temperature 102, troublesome cough, dyspnœa, diarrhœa, difficult deglutition, pain in the chest, profuse perspiration, œdematous ankles, pitting on pressure, muscles very sensitive, bad taste in mouth, and very despondent. Also found two younger brothers complaining with similar symptoms.

By this time my suspicious were aroused as to a common cause for the disease. Passing down the street on the way to my first patient, met Dr. R., who invited me to call with him to see a patient in the lower portion of the village. I here found another case of like character. Returning to my first patient, Dr. S., I asked

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him if he had eaten anything to cause his diarrhœa; said that he in company with several others, had been drinking frozen beer and eating raw ham at a social gathering a few evenings previous. This gave me a clue to the trouble, and I at once pronounced the cases trichiniasis. Dr Andrews, of Marshall, was also making visit to Minneota to see Dr. Sedlitz, a German who was sick. Seeing Dr. A. the day following I learned that his patient had symptoms identical with the cases I had seen, and that we were agreed as to the disease. January, 19th., Fred Perkin, a German, died at Canby and an antopsy sought, but could not be had. January, 20th Joseph Wilford* died at New Ulm. Both of these men were present at the above mentioned festivities, and partook of the frozen beer and raw ham. January, 28th., William Kushner died at Minneota. The Kushner family consisted of six persons; husband wife, three sons and one daughter. They had all partaken of the pork and were all sick. The father died some three weeks previous; was treated by attending physician for typhoid fever with rheumatic complications.

It was desired on the part of Dr. Andrews and myself, that an autopsy be held on the body of William Kushner, and that members of the State Board of Health be present. Telegrams were immediately sent to this end. Dr. C. N. Hewitt responded, and was present at the examation held January 31st. There were also present Drs. Berry, of New Ulm; Bennet, of Watertown; Farnsworth, of Canby, and Marcellus, of Sleepy Eye. The microscopic work was very dexterously performed by Dr. Hewitt, revealing trichinæ in abundance in the muscles of William Kushner. Specimens of ham were also subjected to microscopic examination revealing trichinæ. Later, samples of all pork upon which rested suspicions were sent to Dr. Hewitt. The result of such examination was at once made known, and diseased pork destroyed. The hogs in question were raised by the village butcher, Peter Pickles, in close proximity to his slaughter house. Refuse matter of all kinds could be eaten by the swine. Rats were known to infest the premises in numbers.

*See Dr. Carl's report, page 181

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Report of a Case of Trichinosis, by Dr. B. Carl, Practising Physician and Surgeon at New Ulm, Minn.

NEW ULM, Minn., January 29, 1882.

To the Honorable State Board of Health of Minnesota:

GENTLEMEN:

In the night from the 9th to 10th of January, 1882, I was called to see a young man, Joseph Wilford, aged 23 years, who was reported to me lying sick at the house of his parents, in the town of Siegel, in this (Brown) County, eleven miles distant from this city, and who had come down to the above place on the fourth of January, from the town of Minneota, in the county of Lyons, on account of feeling very much indisposed and fearing to be sick for some time to come. From his arrival at his parents' home on the fourth up to the tenth of January he had received no medical attendance, but was treated by his mother, for a bad cold, although he was confined to his bed, from the day of his arrival at home. Complained from the begining of his having been taken sick the first day of January 1882, of general weakness, loss of appetite, severe pressure in stomach, nausea and eructations; often vomiting and diarrhœa; had chills and restless sleep. These were all the data I could elicit at the time of my first visit to the young man in the night from the 9th to the 10th of January, when I found the patient in the following condition:

In connection with great general debility and broken down vitality, the skin was hot, the eyes injected and watery; he suffered from most intense headache, œdematous swelling of the face, principally of the eyelids and the conjunctivæ. Motion of all the muscles was very difficult and painful, had severe shaking chills followed by lighter ones; pulse very irregular, from 110 to 120 per minute; temperature remarkably high, 103°; the tongue was scab-like coated, dry and chinky, also great dryness in pharynx; bloody diarrhœa; diagnosis, typhus.

On my second visit the 15th of January, the debility had to a great extent increased; fever very high; pulse 118 to 125, also very high temperature 104 deg. Diarrhœa had ceased; the abdomen was tympanitic, on touch very tender and painful. Patient's hearing is very difficult; has tremor and great restlessness; his tongue moves with great difficulty and has not materially changed; there is also considerable trouble in swallowing; he is almost entirely unable to take anything, medicines not excepted. The skin is covered with abundant sweat and sudamina. All the limbs are perfectly stiff, with most severe pains in the muscles, and with the swelling of the muscles an œdema spreads from the upper arm towards the hands, and from the thighs downwards to the feet. (The reverse progress of watery exudations in ordinary cases.)

Previous to my next and last visit to this patient, I had occasion to mention the hopelessness of the case to Dr. Alfred Muller, of this city, who at once suggested, that in case it were not a typhus taking a very tumultous course, it might be "trichinosis," and although the doctor admitted, that he had never diagonised a single

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case of that disease, during the many years of his active practice, he might, nevertheless, like others, have taken and treated such cases for typhoid fevers. On the ground of the above suggestions, I at once hunted up all the medical publications at my disposal, treating on the subject of Trichinosis, and finding a couple of monographs corroborating the symptoms in this case, I visited my patient for the last time on the 19th day of January, the tenth day after I was first called, and found his senses mostly all gone and symptoms of deep sopor; he passes urine and fæces involuntarily; is constantly delirious and shows decubitus on sacrum and right hip. He died January 21st, under all the symptoms of a typhoid fever.

On this occasion, it was for the first time that I learned from his mother, of the eating of raw ham by the deceased, on New Year's eve, 1881, at Minneota, Lyon county, in company with quite a number of others, who afterwards were all taken severely sick or died, he having mentioned the eating of the raw ham to her by way of conversation, during his sickness.

At the time of young Wilford's death, news had reached here that two persons who had partaken of the same raw ham at Minneota, had died, and several more remaining very sick. I therefore at once concluded to procure a piece of flesh from young Wilford's body, which I did on the day of his burial, the 22d of January, and submitting small pieces from the deltoid muscle to the microscope, a very immense invasion of the muscles by trichinæ was easily discovered and demonstrated to a very large number of our citizens, in all their phases. Thus satisfied of the true state of things revealed in this case by the microscope, Doctor Muller and myself had the parties interested at Minneota at once notified of what their companion, Wilford, at the New Year's eve raw ham feast died, in order to govern themselves accordingly.

Respectfully submitted by your obedient servant,

DR. CARL.

VACCINATION.

What it is and what it has accomplished in Minnesota, in 1881-'82.

By C. N. Hewitt, M. D., Secretary State Board of Health.

If any apology is needed for this paper let it be found in the fact that since the beginning of my service in 1872 we have never met so many outbreaks of small-pox, or encountered more opposition to vaccination among the farming class as during the years 1881-

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'62. Further, the operation of "animal vaccine" has been so uncertain and, at times, so abnormal and severe, that more than one of our health officers has in ordinary practice declined to continue its use, and in epidemics, all, I believe, have, upon my advice, used humanized virus with increasing confidence and success, as soon as it could be obtained.

It is necessary also to state here just what it is meant by the terms *Animal* and *Humanized* Vaccine Virus. By "animal" virus is meant vaccine either in "scab, cone" or "on quill" or "ivory points," taken from the calf and furnished by the best producers in the country. I do not know all the sources of supply during these years, but I believe by far the most of it was from Dr. Griffin's establishment at Fond du Lac, Wisconsin. *All* furnished by him was, I believe, in the form of "ivory points." That furnished by others was in the form of "scab" and "cone" also. By "Humanized virus" is here meant vaccine virus, taken from typical vesicles seven or eight days old on the arms of healthy young children. This removal is effected in this way. The *top* of one of the cells of the vesicle is carefully opened with the point of a fine cambric needle. The clear virus, which exudes *without any pressure*, is carefully taken onto the points of quills or ivory strips with lancet-shaped ends. Each perfect cell is in this way successively opened, till all the virus is taken which will in this way exude. I have myself repeatedly charged fifty points from one vesicle, and, if used within 24 hours, found their operation certain, prompt, and all that could be desired. As the rule with our health officers is to obtain at least three good vesicles on each child, if all are perfect, from 100 to 150 points may be charged from each child. The rule has been, for various reasons, not probably more than 50 points from the average of children used for this supply. When the virus was not needed for immediate use, the "scabs" of perfect, unbroken vesicles, as above provided, have afforded a more permanent and very satisfactory supply. These scabs are allowed to remain on the arm till naturally detached, and are then sealed up in wax, if not needed for present use. So preserved, they have retained their

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efficiency for, within my knowledge, two months, and I have no doubt, longer.

As this paper relates only to Minnesota practice, it is unnecessary to enter into any detailed defense of the increasing use of humanized virus, as above defined, other than is afforded by the experience of health officers, as described in the preceding reports. Nor must it be inferred that there is any disposition on the part of health officers or of the State Board of Health to oppose the use of animal virus. We are dealing with a practical question. No theoretical considerations however plausible can stand in the way of a demonstration by actual use of any form of vaccine virus. It is to this test that these two forms of vaccine were brought in 1881–'82 in dealing with more than five hundred cases of variola or varioloid, and with several thousand persons directly exposed to the contagion. Some of the time animal vaccine could not be procured in anything like sufficient quantity, and much which was obtained was of doubtful purity, and very often almost, if not entirely inert. We were actually driven to the cultivation, distribution, and use of humanized virus, one or several removes from the calf. It is probable that so systematic use of humanized virus in direct conflict with variola in so large, a number of cases and outbreaks is at this date in this country rare, and the experience is therefore of value.

The largest experience in collecting humanized virus probably was that of Dr B. R. Palmer, of Sauk Centre, Stearns county. When I went there in November, 1881, the doctor, then an invalid, entered heartily into the work of collecting and distributing humanized virus, sending it at my request all over the state, wherever called for. Under date November 22, 1882, he writes: "Agreeably to your request, I am sending every day into the country such humanized virus as I can spare, and shall continue to do so. Points and crust. Free vaccination unlike free gospel, seems to be attractive enough, and people are rushing in for it. So far the great bulk of my vaccinations, in Sauk Centre, have been men. Farmers, threshing machine men, railroad men, those likely to spread small-pox. (For confirmation of this opinion see pages 38 to 42 and 44 *ante*, when the disease was spread by

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threshers, school teachers and gravestone dealers.) Since Sunday about 250 of such. I shall procure all the humanized virus I can get hold of, as you direct. Do not know how much. It will be considerable, I think." The doctor's personal popularity in Stearns county was such and the confidence in his professional judgment so great that he was a power in making vaccination general.

He noticed very early that "the vaccine fever was accompanied in many cases by an erythematous eruption, very annoying from the intense itching." It also caused a great deal of alarm among the people and cursing of the doctors for introducing diseased material. This eruption had all the characteristics of measles, variola and chicken pox combined. The doctor was exceedingly careful in selecting and using the virus, hoping to avoid entirely the ill effects which followed much of the vaccination with animal virus at this time. He writes: "I have felt very bad about my ill luck, till I found that the same results followed vaccination elsewhere. In one of of my cases, a young man, decided chicken-pox vesicles covered nearly the whole body. I have not yet ventured to take the virus from such cases (in children even.) The reference here is to the arrangement that no virus should be distributed, except that taken from typical vesicles on healthy children." Nov. 28th he writes: "I have vaccinated a host of people who come here from all parts of the country. I find that fully nine-tenths of these revaccinations with humanized virus take. The operation of the virus shows itself of all grades from the most vicious to the mildest form, and not always depending upon the interval between the old and the last vaccinations. These were with "humanized" *one remove* from the animal. The severity of the operation is about that of the animal. The Doctor had begun a series of experiments to endeavor to account for some of the abnormal symptoms following the "one-remove" humanized virus, but his already weakened body failed so rapidly that he was compelled to stop his investigation. He died May 6th, 1882. He was a noble specimen of the best type of New England physicians who came to this State in the earliest settlement, literally bringing the best talents in a worldly sense, and wearing himself out in his devotion to his art. His latest work

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was that described in this paper. His own description of it he was too sick to write out, and he left no notes upon which any conclusion can be based, further than the excerpts above given from his letters to me. It is a duty to state that his collection and distribution of several thousand " quills" and many scabs was done at a time when his physical infirmities, as he pathetically said to me, " unfitted him for more active labor." But he underestimated his ability and influence. He gave time, thought, and labor, without fee or hope of reward, and set an example of patient and faithful well-doing, which will not be lost among his professional brethren who knew and worked with him, or among a people where he was the beloved physician in truth and indeed.

The health officers "in the field," if I may so describe them in charge of epidemics, speak and write in no uncertain manner as respects vaccination. I will simply refer to their experience.

Dr. Schmidt, health officer, Richland, Stearns county, gives on page 27 ante the first and most striking illustration of the value of "vaccination." The refusal of one man to accept vaccination for two unvaccinated children after the exposure of one of them to small pox resulted as follows. Fourteen days after, that child came down with small-pox, and soon after, the other one, by exposure to the first. From this first case alone began an epidemic which involved 222 cases of variola and varioloid, and thirty-four deaths. Two other children of the same family vaccinated successfully a few weeks before "although living in the same rooms and even sleeping in the same bed with the sick ones, escaped the disease." The evidence as to the protection afforded by a previous vaccination in this locality is worthy of note. Dr. DuBois health officer of Spring Hill (page 33 ante) notes "that the heads of families were nearly all vaccinated in Germany in infancy, and that a large per cent. of the adult male population had also served in the Prussian army, where they were revaccinated," and he calls attention to the immunity that this entire class enjoyed during the epidemic "which found its victims almost wholly among children and young "women and men born in this country."

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From the first family affected a threshing crew of young men carried the "disease to several families, and there was not any difficulty in tracing every case which occurred in the county of Stearns thereafter, to the first case, the child for whom the father refused vaccination. As to virus Dr. DuBois reports (page 34 et seq. ante). "Bovine virus was thrown aside entirely. The record it had made for itself, its utter unreliability and the necessity for dealing with the people in no uncertain way, compelled a resort to humanized virus." He proceeds to describe his way of collecting and using it, and then writes. "With this humanized virus the vaccinations were very suecessful. It displayed great celerity in its operations and no unduly sore arms were produced."

It has been my rule for several years to urge upon health officers the *immediate* vaccination of all persons in infected families not yet down with small pox. Dr. Du Bois followed that rule and states that "this was done with the view, which was many times realized of mitigating the attack." It very often converts variola into a moderate varioloid. He gives in page 36 a striking example of the efficiency of vaccination in this respect. See also page 45 by Dr. Bebee, and page 79 by Dr. Burnham. Upon the following page Dr. Du Bois gives a remarkable case of variola following after an immediately preceding and apparently successful vaccination as a rare fact I quote further illustration from English authorities. I quote from the 12th report of the medical officer of the privy council of Great Britian, a note by John Simon, which is exactly parallel. He is speaking of the repeated trials in foreign countries to communicate syphilis by taking vaccine from the arms of such persons to healthy people, and commenting on the remarkable fact that in not one of these experiments had anything like syphilis resulted. In a note he says, (page 40 of report) "For not once or twice, but at least, "hundreds of times especially in the early days of vaccination, "something to the following effect has occured. A patient after "exposure to the infection of small pox, has been vaccinated a little "too late for his protection, warned of his danger, he has had "recourse to vaccination, when already small pox was latent in his

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"system. The two contagia, the innoculated vaccine contagion "and the previously inhaled contagion of small pox; have been "simultaneously operative in him; the latter producing the general "eruption and high febrile disturbance of small pox, while the "former has produced at the vaccinated spots characteristic jen- "nerian vesicles. And from the lymph of those jennerian vesicles, "again and again, successful vaccinations in other subjects have been "performed; vaccinations pure and simple without any communi- "cation of the small pox, though the patients whose jennerian "vesicles had yielded lymph for their vaccinations had, at the time "their bodies generally pervaded and drenched with the infection "of the other disease."

A similar case was that of the Rev. Meinard Luthard, O.S.B., of Melrose, Stearns county, in the same epidemic. I found him, after exposure, unwilling to submit to vaccination, and it was only after several days that I succeeded, almost by force, in vaccinating him with humanized lymph. The vaccine worked in five vesicles, but he died of variola. Worn out with constant attention to the sick, and not apparently a vigorous man even in health, he had not the strength to go through an attack, and yielded to it after a brief ill ness.

These are the only authenticated cases of the kind which have come to my notice in Minnesota since 1872. Dr. Jenner, pps. 170-171 of his original report on variolæ vaccinæ, 3d ed., 1801, quotes cases in which vaccination has gone on to successful issues, along with measles and scarlatina; neither disease materially affected by the other. and p. 167, ibid, illustrates, as does our experience, the power of vaccination to suspend the progress of small-pox several days after exposure. Still more remarkable evidence of the distinction between vaccine and small pox and of their relations is the following illustration, which I take from Dr. Robert Willans' work, "On Vaccine Innoculation. London, 1806. On page 6 he says, "I must, however, observe that fluid taken from the vaccine vesicle on the arm of a person affected with variolous fever and eruption, and inserted into the arm of another person by a clean

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lancet, produced the vaccine disease alone. Numerous experiments assure us of the correctness of this observation. He gives in Plate I., No. 3, of the above work an engraving. It exhibits a vaccine vesicle on the 9th day, as it appeared on the arm of a boy who had been inoculated with variolous matter ten days before vaccination There is a variolus pustule which rose and matured within the border of the vaccine vesicle. Matter taken from this pustule communicated the small-pox, while fluid taken from the opposite side of the vaccine vesicle communicated the cow-pox.

The tubercular pustules which sometimes occur in persons affected with variola coincident with vaccine have been repeatedly noticed in the epidemic of 1881 and 1882 in Minnesota, (see pages 136 and 142 ante, cases seen by Dr. Dunn), and indicates the abortion of variola by vaccine. Several incidents are recorded by health officers (e. g. by Dr. Beebe, health officer town of Albany, Stearns county, page 45), where the most trifling exposure was sufficient for infection, opening the door of a room occupied by sick of small-pox and instantly closing it again. The older writers on this subject constantly refer to the exceeding activity of small-pox virus. A striking example is given by Dr. Capehart, health officer in Southern Dakota, page 81 ante, where a bridegroom having varioloid, as it afterward appeared, gave the disease not only to the bride but to her father to the minister who married them, to one of his pupils, and to his housekeeper. In some of these cases the exposure must have been very slight, yet it was sufficient.

My object in elaborating this matter of vaccination in infected families is to make it apparent that there should be no question that vaccination at such times of all, not yet sick with variola, should be immediately performed, and if possible with humanized lymph. Popular opposition to this measure is very considerable, and even medical men are not without doubt on the subject. One health officer believing the rest of the family already infected by exposure to one of their number sick with small-pox, did not vaccinate them, as I had advised, because of the popular belief in the town that a small-pox case after vaccination was so much worse by reason of the vaccination, that he died, while others

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not vaccinated and having small-pox, recovered. But his chief reason was, that his teacher in medicine Prof. Niemeyer had disapproved of such vaccination. I instructed him to vaccinate them citing some of the experiences quoted above, and saying that, while I was utterly at loss to know how one might judge this or that person to be at any given time "infected," I was sure that vaccination would show whether they were or could be *protected* (wholly or in part) which is the problem for the health officer at such times. Here is what Niemeyer says. I quote American edition, 1873 page 555. "During an epidemic persons who have been vaccinated but in whom the vaccination has not yet taken, are attacked by small pox, and the two diseases run their course at the same time without modifying each other. These cases show that vaccination during the period of incubation of small pox cannot cut short the disease, and also that the susceptibility to vaccination is not lost during the period of incubation. To avoid vaccinating persons who are already in the incubation stage of variola, it is well for a physician to vaccinate, without delay, all of his patients when he considers the operation necessary, as soon as he knows of the appearance of the small pox in the vicinity."

How is one to know when a given patient is in the incubation of small-pox? Compare the history given by Dr. Burnham, Health Officer of McCauleyville, Wilkin Co., on page 78 ante. A mother with virulent small-pox dies in three days. Her children with her all of the time, some of them sleeping in the same bed. Dr. B. vaccinated the children on the day of the mother's death. All of the vaccinations took, and not one of them showed the first symptoms of small-pox. See also cases in one family reported by Dr. Dunn, Health Officer, Scott Co. Brother and sister vaccinated June 26th with the other six children had all the symptoms including eruption, as two other older brothers, who had small pox, yet their pustules aborted after a few days, while the older brothers went through the confluent form. The only difference between them was that vaccination took in the first two and not on the last ; but what a difference caused by vaccination after exposure to small-pox, just how

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long unable to learn. This family of eleven persons lived in a small and carefully-closed house, fearing the effects of fresh air on the disease.

This same family afford an illustration of the resistence some constitutions offer both to variola and vaccination.

One girl aged 17 successfully resisted three attempts to vaccinate her, and also escaped small-pox, though living with and nursing the sick. In the two families named in the preceding page (p. 141 ante) we have, as Dr. Dunn states, "a typical picture of what small-pox is without vaccination, and of the glorious benefits of the operation seen at its best. The families are of the same size; living a few miles apart. The ages are nearly the same. (There are ten persons in each family.) The father of the first family had small-pox in youth the mother vaccinated in infancy. *None* of the 8 children had been vaccinated. The small-pox enters the family; they take no precaution. Of the eight unprotected persons it rapidly destroys three; ruins an eye for another, and scars the other five, four of them girls, in a frightful way. The other family of 10 hear "that they have been exposed to small-pox, not aware that the disease has been for ten days operating in the system of one of their number. They are vaccinated with reliable bovine lymph. Two days later one of the ten comes down with small-pox, which runs a mild course. The others are all daily and nightly exposed to the disease, but their vaccinations work well, and not one of them is attacked. Further illustrations from our own experience of these two years and since 1872 are abundant. The rule is with us in Minnesota, after repeated trials and successes, and no injury to any one, to vaccinate immediately all members of an infected family, irrespective of the *probable* incubation of small-pox, provided that no symptoms of the actual outbreak are present in the one to be vaccinated. And the further rule to use in such cases fresh humanized lymph directly from the 7th or 8th day vesicle, because such virus works several days earlier than the best bovine virus, and is more certain to "take" than any other.

The most serious difficulty with which, in a profesional sense we have to deal in Minnesota, is the neglect of careful registration of

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the facts of the use and results of the use of vaccine. Two years ago for the State Medical Society I endeavored to collect some reliable data from the leading active physicians of the state and failed to get careful statistics from any. The keenest observations and best records are naturally made by health officers in charge of endemic or epidemic outbreaks of small pox. In such work our rule is for the health officer to give his whole time to the control of the disease, and he has abundant leisure, if his field is not extended, to study these matters in detail.

Finally, it is my duty to call upon all intelligent people to come up to the measure of their responsibility as respects the loathsome and fatal disease small pox; a work easily done if heads of families, mothers particularly, will insist upon the vaccination of children in early infancy, and that it be carefully and thoroughly done. By that is meant to secure at least, three perfect vesicles upon each child. Unless they are obtained, repeat the operation until they are. If mothers will be careful to insist on this, they will find their family physicians ready and glad to co-operate with them.

Do not wait for a "small pox scare" before doing this. That is the worst possible time for vaccination, for in the hurry of such times, there is greater chance of inert virus. careless operation and neglect of that careful supervision of the progress of the vaccination, which it should have for the most certain results.

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SANITARY CONFERENCE AT MINNEAPOLIS,

Under the Direction of the State Board of Health, on

WEDNESDAY AND THURSDAY, DEC. 6 AND 7, 1882.

PLACE OF MEETING:—The Rooms of the Minnesota Academy of Science, 110 Hennepin Avenue.

All interested in matters of Health are cordially invited to the sessions of the Conference.

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PROGRAMME FOR WEDNESDAY, DEC. 6TH.

AFTERNOON SESSION—2 P. M.

The Governor of the State will open the Con erence with a brief address and preside at this session.

GENERAL SUBJECT—' The Ways and Means of Public Sanitary Work."

PRAYER.

FIRST PAPER—by Dr. J. C. Cockburn, Health Officer of Minneapolis.

1. SUBJECT—"The Work of a City Health Officer, and how people may assist and support their local Board of Health "

SECOND PAPER—by Dr. A. T. Conley, Health Officer of Cannon Falls, Goodhue County.

2. SUBJECT—"The Duties and Difficulties of a Village He alth O.ficer."

THIRD PAPER—by Dr. A. G. Slagle, Health Officer of Winnebago City, Faribault County.

3. SUBJECT—"Popular Aid in the Prevention of Disease."

GENERAL DISCUSSION.

EVENING SESSION—7:30 P. M.

Hon. John S. Pillsbury will preside at this session.

GENERAL SUBJECT—"How to Control Infectious Diseases, and the Work done by Health Officers for that purpose."

FIRST PAPER—by Dr. James H. Dunn, Health Officer of Shakopee, Scott County.

4. SUBJECT—"The Experience of a Country Health Officer in dealing with an Epidemic of Small Pox."

SECOND PAPER—by Dr. E. J. Brown, of Minneapolis, late Health Officer of Montgomery, Le Sueur County.

5. SUBJECT—"The History of an Outbreak of Small Pox in a Rural District by the Health Officer in Charge."

GENERAL DISCUSSION.

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PROGRAMME FOR THURSDAY, DEC. 7TH.

MORNING SESSION—10 A. M.

Rev. S. M. Campbell will preside.

GENERAL SUBJECTS—"School Hygiene; Health of Pupils; How to teach Hygiene in Home and School."

PRAYER.

FIRST PAPER—by Hon. D. L. Kiehle, State Supt. of Public Instruction.

6. SUBJECT—"What of Hygiene (and how) Ought to be Taught in the Public Schools."

SECOND PAPER—by Rev. James Dobbin, Rector of Shattuck School, Faribault.

SUBJECT—"The Methods and Results of Physical Training in Shattuck School."

THIRD PAPER—by Prof. L. B. Sperry, Carleton College, Northfield.

7. SUBJECT—"The Dangers, Mental, Moral and Physical, incident to our present methods of School Education."

FOURTH PAPER—by Prof. J. Allen, Principal State Normal School, St. Cloud.

SUBJECT—"Physical Education and Culture in Schools."

FIFTH PAPER—by Hon. T. B. Walker, Minneapolis.

8. SUBJECT—"The Influence of our Present System of School Grading upon the Health of Pupils—by an Excessive and Injurious Competition." (Read but manuscript not given to Secretary.)

GENERAL DISCUSSION.

AFTERNOON SESSION—2 P. M.

Hon. A. H. Young, Judge of District Court, will preside.

FIRST PAPER—by Rev. Dr. D. C. John, President of Hamline University.

9. SUBJECT—"A Plea for Fresh Air and Exercise."

SECOND PAPER—by Rev. R. F. McLaren, of St. Paul.

10. SUBJECT—"The Relations of Religious to Physical Culture."

THIRD PAPER—by Rev. C. F. Van Anda, Minneapolis.

11. SUBJECT—"Harmony between Piety and Sanitary Laws."

FOURTH PAPER—by Rev. James McGolrick, Minneapolis.

12. SUBJECT—"Pastoral Duties in Relation to Hygiene."

GENERAL DISCUSSION.

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EVENING SESSION—7:30 P. M.

Bishop C. D. Foss will preside.

FIRST PAPER—by Rev. D. R. Breed, of St. Paul.

13. SUBJECT—"Recreation for Busy Men,

SECOND PAPER—by Rev. J. A. Tuttle, Minneapolis.

14. SUBJECT—"The Sanitary Influence of Cheerfulness.

THIRD PAPER—by Geo. Wirth, architect, St. Paul.

15. SUBJECT—"The Sanitation of the House as respects Warming, Lighting. Ventilation and Plumbing."

FOURTH PAPER—by Prof. C. H. Hall, University of Minnesota.

SUBJECT—The Sanitary Character Imparted to Water by Rocks and Soil."

FIFTH PAPER—by Dr. O. H. Millard, Stillwater. Pres't State Med. Society.

16. SUBJECT—"The Relations of the Topography of a City to its Mortality."

SIXTH PAPER—by Hon. Sumner Ladd, of St. Peter.

SUBJECT—"The Observance of the Laws of Nature.

GENERAL DISCUSSION.

Close of the Conference by the Presiding Officer.

Governor Hubbard opened the Conference with a brief and congratulatory address, promising to the work of the State Board of Health and such gatherings as the present one under the direction of the Board, all the aid in his power. The proceedings of the Conference were fully reported, especially by the Pioneer Press, and the popular interest and attendance increased to the end.

The State Board of Health publish all the reports made, and papers read which were handed to the Secretary.

The Board expresses its hearty thanks to those gentlemen who, at so much personal inconvenience oftentimes, wrote and read the papers herewith presented.

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THE WORK OF A CITY HEALTH OFFICER,

And how People may Assist and Support their Local Board of Health.

By Dr. J. C. Cockburn, Health Officer of Minneapolis.

MR. PRESIDENT, AND GENTLEMEN:—It is with pleasure that I meet you on this occasion. The occasion which calls us together is one that should be of interest to all good citizens. The meeting of a body for the advancement of a common cause, for the advancement of a science which must redound to the benefit of mankind at large should be hailed with pleasure. Sanitary science inculdes everything that can prevent disease and promote the public health.

Any means that will promote the *public health* will correspondingly increase the well being of the largest number of individuals

It is my part in this conference to say a few words on "The work of a city health officer and how to assist and support local boards of health." Now to a large majority of the laity and to *quite* a *number* of the *better thinking* part of our people this question will arise "why should we assist the board of health?" Is not the health officer the one to attend to the duties of health dispensing, and why need we make ourselves any care about anything pertaining to its duties? is a question if not asked, or not on the mind of many otherwise good citizens, is acted by them every day of their lives.

To understand why the people should assist the board of health it is but necessary to consider the objects and purposes of boards of health and sanitary organization. Then I think it will be plain to all who give it consideration that any assistance rendered by the people is but an act of self preservation.

The object of boards of health either local, state or national is to prevent the spread, suppress the cause, and endeavor by proper sanitary measures to regulate and control the ravages of disease. This may truly be called preventative instead of curative medicine.

The objects of boards of health if attained must result in prolongation of life and reduction of the mortality rate.

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This result of public sanitation touches every home in the land. Every man, woman and child must feel its beneficial influence. Every state, institution, manufacture, every trade and occupation receives a healthy impulse from it; domestic happiness, charities and national prosperity are modified by it.

Now some may ask on hearing this statement where are the proofs of any results from the labors of boards of health and sanitary organizations?

I think we have proof. A study of the reports of the register general of England shows that during the last decade, the death rate has fallen off one in 1000 population per annum and that more than ¾ per cent. of that falling off is due to a reduction of death from zymotic diseases; and further that half of this decline is in the number of deaths from fevers; and in this class of diseases, it is claimed the best results of sanitation are obtained. Further, it must be kept prominent, in view of this, that during the last ten years most active measures have been taken in sanitary work.

This falling off of one in 1000 population may seem like a small reduction, but let us consider it in its fullest bearing. It will not do to scan with the eye the figures, the ciphers and units of these statistics; we must get a look at what lies deeper—the joy and happiness which flow from this expansion of life, this result of sanitary science, which may possibly require a scientific imagination to appreciate.

Let us make a home application of this reduction of death rate. In the city of Minneapolis the reduction of one in 1000 would represent 80 lives saved in a year, and is not this work or the organization, of which this is a result, worthy of popular support? Let us take still another view of the case. The most authoritative statistics show that each death represents twelve cases of serious sickness and, to take it home to our own city, in Minneapolis it would represent 960 cases of serious sickness prevented, the attendant expense, the sorrow, and loss of time, which all this sickness would entail saved to our citizens.

There is yet another view of this which I wish to place before you. I find on further study of the statistics that the preservation of life by sanitary work has had its good results with the rising generation, and that the number of those who reach adolescene has been increased more than 12 per cent. or in other words, where only eight persons passed from childhood to manhood, nine now join the ranks of wealth producing citizens; that where only eight passed the fifteen years of toil and hardship from 20 to 35 years, nine now

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outlive that time. Is it not safe to infer from this that the work of the sanitarian has a salutary effect on the young in childhood, and enables them, not only to reach maturity, but also to withstand the ills that flesh is heir to and to avoid premature graves.

Having stated in my opinion some of the reasons why health boards should be supported and shown, some of the reasons touching individuals as well as society and the commonwealth, it will be in place to mention some of the ways in which aid and support can be given.

As far as can be learned from the experience of sanitarians and boards of health, very little direct aid has been received from the populace. It is a melancholy fact that of the numerous calls at the health office so few show the least spirit of assistance. As a rule it is with rancor and bitterness they approach the health office. A desire to wreak vengeance on a neighbor because he has accumulated more filth about his place than himself and desires the health officer to go at once and remove his neighbors nuisance that he may have satisfaction.

Now it becomes the duty of a city health officer to devise means for the preservation of health and to endeavor to eradicate all known causes of sickness and in the capacity of his office he will find himself called on to do every imaginable and many unpractical things.

That which gives most trouble and causes the most labor is the endeavor to remove all filth and suppress filthy habits, and in a city this a very important factor of a health officer's duty.

It is to be regretted that the importance to health of cleanliness is not known, or if known is little heeded. The old adage "cleanliness is next to godliness" is familiar to all, but when godliness is not striven after, of course any departure from cleanliness is not a thing to awaken the conscience on that score. Let us promulgate the fact that living in filth is suicidal, that compelling others to live in it, is murderous, and I think through the selfishness of human nature some action would be aroused.

Among the populace different opinions exist as to the character of cleanliness necessary to health. Some believe that only washing the body and clean clothing is necessary, and shudder at the sight of a dirty-faced urchin romping in a broad, open field, with abundance of fresh air, and wonder that the child does not die with dirt, when one undergoing the ordeal of scrubbing and cleaning and wearing immaculate clothing is always sick. Perhaps a view of the back-door surroundings will reveal that all the water

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used to make so clean an appearance of house and person is deposited above ground, and with it the other decomposing refuse, which is allowed to remain till a health inspector views it and orders its removal. Or perhaps an inspection reveals yards, walks and all external points clean and well kept, but a large privy vault with the accumulation of years, and a cesspool may be with an opening into the house through a sink, or just outside a catch basin. These give off their stench, not only to the occupants of the place, but to the neighborhood. Filth pervades the air; disease attends in some of its varied forms; and yet they question why. It is the work of a city health-officer to insist that these causes of sickness, which may cause death, be removed. A want of support from the people directly interested in this makes much difficulty for a health-officer. A prompt compliance with instructions to make clean and be healthy would very much facilitate the performance of the work, would be great encouragement to health officials, give more time to further the work of sanitation, and very much help to render a city healthy. Another great evil city health officers have to contend with is the condition of tenement houses. In older cities this exists to a greater extent than in our western cities, but there is no city of any size which has not passed years enough to have its tumble-down rookeries, with their leaking roofs, decayed stairs, floors and walls, where squalid wretchedness has been half-sheltered, where sickness has been, where deaths have occurred, and where germs of disease find a hotbed in accumulated filth. Talk about the gilded saloons tempting the poor day-worker into their bright folds. Who would not rather spend his night in a warm room than to sit shivering at his wretched home?

What should be the health officer's work in this case? To exclude tenants from such death-dealing dens and prevent their occupancy; and the populace, the city and the State legislation should give boards of health power to condemn and close all such properties. As a rule the owners or agents of such property, who will grind rent out of a tenant for such, or exact payment from them for the privilege of suffering, is not a person likely to assist in any work for the good of the citizens, and health officers find their work hemmed in here by all sorts of difficulties which only the force of law can overcome.

It being the work of health officers to endeavor to prevent all cause of sickness, there is another source where it is sometimes more difficult to effect a removal, this is the houses of well-to-do people, where they had supposed the plumbing and sewerage was

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perfect. Sickness breaks out in the family, virulent Diphtheria perhaps, the family are panic stricken, considering their own premises perfect, they survey their neighbors, and perhaps find something which they at once complain of. An inspection finds the immediate surroundings good as they go, but, on inspecting the trapping and sewage, worthless arrangements are found. Traps which "siphon," flushing which is inadequate, ventilation which is worse than none. Now to pursuade the owner that this condition of things should be changed is a work of health officers not easy to perform sometimes. A way in which this could be obviated, I think, is something as follows. All boards of health should receive the best sanitary journals published. At the office of health officer should be kept the journals of sanitary science, in which will be shown the best known and tried system of ventilation and sewage, those which have been tried and proved and recommended by sanitarians are certainly more trustworthy than any that come through advertising handbills only to the public. A co-operation with the board of health of cities by property owners, architects and builders, would be most likely to secure results that would give the health officers little trouble afterward, and be a great boon to all concerned. Associations for the improvement of grounds, streets and environments are of much support to boards of health when rightly managed. We have one such in this city, and from the quarter where this exists, but little work is obtained for the health officer, and it is to be hoped more will spring into existence ; and it should become the duty of boards of health to render all assistance to such associations in their good work.

There is another work for health officers to do which should receive the fullest support of the people; this is the suppressing of contagious diseases. Now, it is true that in this duty there may be more assistance from the people than is received from them in other causes of sickness, from the fact that nearly all are alarmed when they know of an outbreak of diphtheria, scarlet fever or small pox, and rush to report any known case in their neighborhood; but usually the assistance ends there. They may ask for some preventative remedy, want some medicine to take so they won't "catch it," and may be offended if told to go home and clean up. But even this assistance enables the health officer to take timely precautions. A difficulty met by a city health officer in efforts to suppress these diseases comes from the dislike to having a placard on the house announcing its quarantine. Many will assert it is so hard

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to have no one come in, and perhaps, if the tables were turned they could not be hired to come in.

This dislike to quarantine causes many to try and hide the knowledge of contagious disease from the proper authorities, and I am sorry to say there are persons calling themselves doctors who will aid and abet in hiding the same. Now if instead of this, every effort was made by all to warn their neighbors off, and keep the contagion secluded, what a saving of life might there be, and with what ease might the health officer control the ravages of these most frightful diseases? The lack of co-operation of low rate physicians with the boards of health, is a formidable difficulty. Let a physician who has little means, small practice, less character and no back bone, and a portion of common sense to match, be called to treat a case of diphtheriá or scarlet fever and find the family do not want the case reported or the family quarantined, and for fear of losing the case and its compensation, he will lend himself to do a great wrong in leaving others exposed to the disease. Perhaps such physician may have such sinister idea as this, that spread of the contagion may make him more practice. As a remedy for this evil, I would suggest that city councils, county commissioners and town supervisors, retire all such physicians on full pay.

A medical friend related to me the other day how he had persuaded a lady whose child had diphtheria, and who at first was averse to quarantine, that it was her duty to insist on her house being quarantined, by suggesting to her that she ought to do by her neighbors as she would be done by. The nearest neighbor was a close friend, and both had several children. This physician retained that family by his good sense, and gained the confidence of the neighbors, who were sensible people, and this is the class we as physicians wish to retain.

It becomes the duty of every person to assist in every way they can to promote health, and spare their neighbors as they would themselves from any and all causes of sickness, and to assist any health officer, and this can be done by every one constituting himself or his family a local board of health, and first place his own house in order. Before reporting his neighbor's mole hill, let him remove his own mountain of filth or cause of disease. As the law-abiding citizen never fears to meet the officer of the law, so let each citizen be ever ready to welcome any member of the board of health on a tour of inspection. Let owners of tenement houses pay attention to their necessary sanitary condition, if only for the sor-

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did purpose of insuring the more prompt payments of rent by prevention of sickness. Let owners of mills and factories and workshops have a care for the ventilation and warming of their places, also provide wholesome water, if possible, and see that filth is not allowed to accumulate and decompose. By such assistance in sanitary labor much gain may result, if only by saving of time, from men not having to lay off sick so much. A gain, in labor, affected by having healthy hands to work will result.

Not only will property holders, manufacturers, &c., be benefited by supporting boards of health, but individuals will reap a return and in a money point. In corroboration of this statement I will cite the estimated saving in money which sanitary work has done for England in the last decade. By reduction of the death rate the estimated saving is £5,300,000, or more than a quarter-million pounds a year. In Glasgow over £225,000 a year has been saved by reduction of death rate; and Edinburgh claims a corresponding reduction.

We know a person's value to the state is based on his capability to produce, and every measure to increase that capability is a step towards wealth production. The reverse of this will cause an increase of expense to the state.

With the figures I have already given as a basis one may readily approximate the value to Minnesota of the reduction of even one in a thousand per annum in 10 years. And I think it is not venturing too much to say that, with full and proper support from the people and the powers that be, local boards of health and the State Board of Health of Minnesota, can make a greater reduction.

The climate of Minnesota is allowed to be conducive to longevity; with attention to the hygienic surroundings, and a little effort on the part of each individual, it might be obtained.

A great discouragement to boards of health is often met, not only in lack of support by the city, but indifference by the legislators of city and state. Fortunately for Minneapolis our Board of Health has not had such discouragements to contend with, but has been cheerfully and liberally supported by the City Council in all efforts to suppress contagious disease, and remove causes of filth; and the Council has interested itself as a body in devising better means of sanitary inspection and ways to remove that which is offensive and detrimental to health. The city, in a sanitary point, has been benefited by this, I am safe in saying. There are still defects in legislation as respects boards of health; but as this matter is a subject of a paper this evening, I shall not encroach on it.

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It will be in place to dwell briefly on the work of a health-officer as regards the board of health. The health-officer is the executive officer of the Board, and it is his work to carry out without favor or partiality the instructions of the board. With the board of health as the responsible party, no health-officer should be deterred from doing the most disagreeable duty. This has here been done. All contagious diseases have been quarantined, or removed to quarantine as speedily as human agency could effect it. All cases of default have been investigated; and we now have two cases in the hands of the city attorney, with instructions to prosecute to the extent of the law, and we have a few working up, where suspicion exists of culpable neglect of some parties; and since this morning another case has come to the front, which will demand our attention. A great mistake is made by physicians in not reporting contagious disease until they are fully satisfied of the character of the disease. The benefit of the doubt should always be given the public. We demand the greatest good to the greatest number.

In small pox there are some physicians who fail to recognise the disease after the eruption appears. A case was reported to me since the present outbreak as probably small pox, and on visiting it the same day found confluent variola in the third or fourth day of the eruption.

A physician should be conscientious enough to own his deficiency in diagnosing this disease, for so he might prevent the spread of the same; but as the prevention and care of these form the theme of a paper to be read here, I will leave it to the other and very probably abler parties to deal with.

DUTIES AND DIFFICULTIES OF A VILLAGE HEALTH OFFICER.

By Dr. A. T. Conley, Health Officer of Cannon Falls.

The present efficiency of health officers and boards in villages throughout our state as far as I am able to learn, seems to be confined to such times as epidemics ravage, or threaten to ravage the community, and even then their activity is in direct proportion to the mildness or severity of the epidemic, usually not acting at

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all until the emergency is upon them, the destroyer in the midst of his fearful work only to be driven out over the graves of his victims.

And here I might observe that the activity of health boards is governed largely by public sentiment. If the public are aroused, so is the health board. If the people are slow and lethargic, the health board is usually the same.

Of course this kind of activity is better than nothing, and I am confident that many health boards have and are doing valuable service in crushing out epidemics, and I am still further confident that there is a growing desire, not only among medical men, but among all classes throughout the state to push the work forward, steadily, constantly, continuously.

Sanitary work must go forward and our watchword and battle cry must be Prevention! Prevention!

I am confident one of the greatest drawbacks to effective work by health officers and boards lies in the lack of definiteness in existing laws.

Let me read: An act relating to boards of health, being Chapter 8, General Laws, 1873, also found in Chapter 10, "General Statutes, 1878," Sections 117 to 120, both inclusive, as amended by General Laws, Extra Session, 1881, Chapter 11.

Chapter 8, General Laws, 1873:

SECTION 1. "All incorporate towns, villages, boroughs and cities shall have a Board of Health, who shall have and exercise all the powers necessary for the preservation of the public health, and who shall hold regular monthly meetings."

All the *powers necessary* for the preservation of the public health.

Under this head for the sake of illustration, I will relate some of the difficulties I have had to contend with. We have in the village of Cannon Falls three flouring mills all run by water, and consequently three mill ponds. Now late in the summer these ponds get very low, and are often emptied of their water in order to repair mill dams, and soon a very bad odor pervades the village from these low or emptied ponds. Then the people begin running to me, crying: "Malaria! malaria! Doctor we shall all be sick! We shall all have typhoid fever! You as health officer must keep those ponds full of water whether the mills run or not, though the dams go unmended, for you have all the power necessary to preserve the public health." What shall I do? For with the stench from those ponds in my nostrils, I cannot help thinking the people have some cause for alarm.

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But while I am pondering this question in perplexity, I am waited on by a deputation of ladies, and a good matron with large heart and ready tongue, inquires: "You are the health officer, doctor, I believe, and of course know the law governing health boards. You know you have all the power necessary to preserve the public health. Now sir; do you know of any dozen diseases combined half so injurious to public health as the intemperate use of intoxicating liquors? Nay, my dear sir, am I wrong when I pronounce it the most contagious of all epidemic diseases, more to be dreaded than either small pox or diphtheria? If this be true is it not clearly your duty to shut up all the saloons, and stop drunkenness?" Here she paused for breath and I caught mine, and told her I would do it, *of course I would*, as that would dispose of the whole temperance question and solve the problem of the day. But before I did it I must first write for orders to the State Board of Health.

But while I am meditating on this and other *public* grievances. I am brought back to personal affairs by the entrance into my office of a rather ugly-looking female of uncertain age, and before I have time to speak she begins, "Doctor, there is a family over on the north side of the river in desperate circumstances; the old man and six children are all down sick with something—I guess typhoid fever, and only the mother and the twins, who are only four months old, are able to be around, and they haven't a thing in the house to eat, and the twins are being brought up on a bottle, and I have given them milk for a week back, and they can't pay a cent.; and I am as poor as any one need be, but I do feel so sorry for them twins; and knowing it was your duty to look after the public health I just told my old man this morning, I was going to see you myself; and, doctor, really you must see that they have something to eat to-day, and them twins——"

Here forbearance ceased to be a virtue, and I fairly shouted, "Madam, do you take me for a wet nurse, a county poor-house and a hospital for paupers, all combined?

As she glided out of the office she yelled back: "A pretty health officer you are. I should like to know if it is not your duty to look after the public health? And here you let people starve and die under your very nose."

But this will suffice to illustrate a few of the difficulties a health officer has to meet under the present indefinite laws. But

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passing over sec. 2, I will read a portion of sec. 3 of the same chapter.

SEC. 3. It shall be the duty of the health officer to make, once in every three months, and oftener if necessary, a thorough sanitary inspection of said town, village, borough or city, and present a written report of such inspection at the next meeting of the board of health, and he shall forward a copy of his monthly report, as soonas rendered, to the State Board of Health." No, I thank you. I undertook it a year or two ago and have not tried it since. Before starting out I read the law carefully—"*a thorough sanitary inspection.*" Would it be thorough to go around back yards, barn yards, water closets, examine water supplies, sewers and a few cellars. Not as easy to satisfy my conscience. What's the use to clean the outside of the cup if the inside stinks. Whitened sepulchers look very well on the outside, but we all know what there is within. No sir, I am health officer and I must to do my duty, or the rising generation will have no blessings for me." So I started out and I knew where to go, for filth was what I was after. I went for the worst place in town. Ordered a general cleaning up outside, then buttoned up my coat and marched boldly in. Children, cats and dogs were thick enough, but the air was ten times thicker. Madam, said I, your house smells horrid. You *must* clean up. Why this floor hasn't been scrubbed in six weeks, and these windows haven't seen water this summer. When were those bedclothes washed? Here I began turning down the bedquilts to make a thorough inspection, when out rolled half a dozen loaves of bread. (These are facts and I will swear to them, and this is not the first time I have seen bread in bed. Once after attending a child with the most malignant form of diphtheria. It died on the fifth night, and the next day when I called that very bed the child had been sick and died in, without a single change in the bedding was covered with eight or ten loaves of bread.) But to return to my thorough inspection. I found the quilts shiny with grease, the sheets black and grimy with sweat and dirt. The pillows looked like base ball bases. I next pushed my way into the pantry. A sour smell of half cooked victuals pervaded the air. The first thing I saw was an immense bread board with half an inch of last year's dough dried all over it. I mistook the dish rag for a mop, and turning to go out I came near falling into a mammoth tobacco pail full of swill. Just at this stage of my investigation Ole came home and promptly ordered

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me out of his house. I went; for I felt as though I had Jonah inside of me.

Can't we have more definite legislation? What constitutes a *thorough* sanitary inspection?

How much power is necessary for the preservation of public health, and in what shall this power consist? Can it be called thorough to go round a house or under a house and not through it? Will it do to go through some houses and not through all? Wouldn't a man have to have a skin as thick as a rhinoceros to undertake it? Shall we not oftener find the cause of sickness *in* the house than on the *out*side? The whole question is full of problems, but it is certainly of importance enough for the law to define specifically just what the duties of the health officer are.

In Chapter 10, General Statutes of 1878, I find two very good sections on quarantine and prevention of the spread of scarlet fever; first-rate, they might have been longer, *but why single out* scarlet fever, and say nothing about diphtheria, its twin sister, and only refer indirectly to small pox, and lump off all other contagious diseases in a very general way indeed? Why not have specific acts against small pox, diphtheria, cholera, syphilis, typhoid fever, measles, whooping cough, mumps, and so on.

Legislate against measles, whooping cough and mumps? Nonsense. Children must have them sooner or later, and it is best to have them before they grow up; have them easier you know. Yes; but why have them at all? Don't children by the hundred die of these very trivial diseases every year? Why a year ago last summer almost every child who took whooping cough in our town, under eight months old, died. I distinctly remember five cases of this kind. Who doubts that these diseases could not be driven out of the country, and kept out, if every health board set about it, and had the law to back them; nay to compel them to activity; and what I say of contagious diseases, I say of many others, the *majority* of others.

But the great problem now is, how is it to be done? How shall we get the ball to rolling?

We have the engine, and the State Board is the engineer, but how shall we get up the steam? But, before answering these questions, let me ask one: Which is of the most importance—the *health* of our children, or their education? We have a fine system of boards of education from the State board down to the various local boards, and the machine works splendidly. Our school laws are a large volume, specific, full, complete almost. How about

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our health laws? Half a dozen pages, fragmentary, general, meaningless, almost. We spend hundreds of thousands of dollars yearly in this great State to *educate* our children? How much do we spend for the preservation of their health?

But to go back, the first step towards thes olution of these question is to arouse pu blic feeling in this matter. I know there is a feeling among some that this cannot be done. That is not a general interest. That people are too dull, or too mean, or too something, and so the wheels are kept blocked. There is too much of the feeling expressed by a brother physician, writing on this very subject, in the transactions of the last State Medical Association. He says: "Pure, innate, hellishness of a certain class prevents active work on the part of boards of health." I sympathise with the brother, and do not wonder he feels so some times; even the great Schiller, exclaimed once, "Against public stupidity even the gods are powerless."

But I believe in most cases it is neither "hellishness" nor "stupidity," but ignorance and indifference. Education and something to do, will overcome both of these. Once interest the people in the question, and we have made a start as a first means to this, and then give them the mighty educator, the ballot. Elect health boards the same as we do educational boards. (We might do it at the same time. and in the same way.) But right here, I know many object, they are so terribly afraid of the corrupting influence of party politics. I know not how it may be in cities like Minneapolis and St. Paul, but in villages party politics would have nothing to do with it. At least it is so in school matters. We bow to the sovereign will of the people, even in party politics, and call it the voice of God. Let us try it, and then let the State board and physicians throughout the State combine with all classes of Sanitarians, and press our legislators for a code of laws to regulate the whole matter. And above all, let us not forget to invest money in it. Invest as much for the *health* of our children as for their *education*, if necessary.

Ah! if I had only had system.and the sentiment of the whole people behind me, with law, I feel confident I could have kept diphtheria out of our beautiful village two years ago and saved twenty-three precious lives, and oh! how much anguish and broken-heartedness. "Rachel weeping for her children, and would not be comforted because they are not."

We have too long looked upon epidemics, disease and death as the providence of God, and if a Beecher should call this a mediæval

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horror, the nightmare of the ages, could we not respond, amen, and thank God we are awaking from this horrid sleep to a better understanding of God and his laws, and that he does not delight in the death of his creatures?

"Let us then be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labor, and to wait"

POPULAR AID IN THE PREVENTION OF DISEASE.

By Dr. A. G. Slagle, Health Officer of Winnebago City.

Gentlemen of the State Sanitary Board, Doctors, and Friends of the Sanitary Cause:

I dare not offer you an apology for the imperfections of my paper. The occasion admits of none. I shall beg, however, to make this explanation, that the limited time allowed to read must necessarily render it somewhat desultory.

Long centuries ago Cicero declared that "Man approaches the gods in nothing so much as in giving health to his fellow man."

I need not remind you that our work to-day is not a visionary search fo the *Elixir Vitæ* of Paracelsus, nor yet after the Fabled "Fountain of Youth" of Da Leon. On the other hand, it is *practical, tangible, demonstrable*, and appeals alike to the intelligent sympathies of humanity everywhere, as it so plainly involves their physical and social welfare.

In attempting to discuss briefly the subject of *Popular Aid in the Prevention of Disease*, I shall employ the term "popular" in this connection, as applying to the people generally, and embracing therefore all classes.

I shall also employ the term "aid" in its most comprehensive sense, as signifying every means which can be brought to bear in assisting in the preservation of health and the prevention of disease, whether of a professional, moral, scientific, legislative, executive, or financial nature.

I shall also, of course, endeavor to treat the subject from the stand-point of the physician, as they are the recognized guardians of the public health.

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How shall we *popularize* our good work ? Who are our aids? What are the difficulties in the pathway of our progress ? And how shall we best surmount them?

To us, these are problems of vital importance to be discussed at this time. We have more or less available to put into the field an army of over 60,000 physicians in the United States alone, embracing members of both sexes. There is now also in operation, more or less successfully, throughout this country and Europe, an organized system of sanitary reform, consisting of the various Local, State, National and International Health Associations, with their various auxilaries.

These require for their successful operation not only the efficient co-operation of this large body of physicians, but the encouragement and assistance of the various municipal, state, national, legislative and executive authorities, and of the people as well.

And the surest way to secure such co-operation and support is by thorough and systematic agitation of the subject in all of its relations to public and individual welfare; and such agitation must be effected through the clergy, the public press, both secular and religious, our educators (in our colleges, seminaries, normal and common schools; embracing of course the various state superintendents of schools, who should be, *ex officio*, leading sanitarians in that direction), our executive officers, municipal, state and governmental, our legislative bodies—and by our insisting, as it is our duty to do, on a more thorough education of the members of the medical profession, in general, on the subjects of hygiene and sanitary science.

Let us examine somewhat in detail the value of these several popularizing aids, if properly secured and disciplined for this work.

1st. The Clergy—Whose potent popularizing influence we are just securing, and some of whose able representatives are co-operating with us here to-day. No class of men are better fitted nor generally more willing to lend their aid in the advancement of any good cause where the well-being of the masses is promoted. Their culture and calling peculiarly fit them for our most efficient aids, and the success of any good cause can in no way be better assured than by a zealous appeal to their sympathies. It would indeed seem that there has never been a sufficiently earnest appeal made by our leading sanitarians in this direction, to endeavor to urge the clergy to bring the matter of sanitary reform before the people generally, whose spiritual guardians they are.

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Ministers of the gospel might very properly make this a part of their home missionary work. Indeed it is apparent to physicians that the majority of men and women in districts not far removed from the centers of refinement and culture, know little more of the simplest sanitary observances than the pagan knows about his soul's salvation.

The next and not less potential aid which we can engage to a greater extent than has yet been done, prevails in the public press. Perhaps there is no way open to us through which we can familiarize the people of all classes with any reform so well as by the aid of the public press throughout the land.

The day is near at hand when every man, woman and child over ten years can read and understand familiar teaching in print, and if sanitarians would more extensively write up, publish and distribute in health primers, newspapers, health journals, popular magazines, familiar tracts, et cetera, the essential principles of home and personal sanitation; in regard to location of houses, barns, privies, wells, grades and drainage, as also of dress, diet, exercise, ventilation of sleeping apartments, cleanliness, and much other like sanitary information as they could understand as preventive of disease, we could not fail to popularize our cause, and thus secure a much needed aid in this direction.

The world has become accustomed to listen for and move in obedience to the voice of the mighty popular press. Can we not appeal more zealously to its potential voice in popularizing sanitary reform throughout the world, for as the press is universal, so our sanitary work is not only national, but cosmopolitan as well, in its scope, and demands the exercise of the very best energies of our human nature.

Our educators also occupy a most important relation to us in securing popular sentiment in favor of sanitary reform. They of all men and women have the best opportunities to educate children, youth and parents, all over the country, in the more practical as well as the scientific principles of hygiene and sanitary science. Indeed, it has become a part of their recognized duty almost as much as our own, and this is right. And it is our duty further to insist as far as possible on the requisite education of the teachers in our common schools to enable them to instruct on the general practical principles, and observance of the laws of health. By securing the hearty co-operation of our State Superintendent of schools, there is much good being accomplished in this direction, but we must not forget that there is much fallow ground in this fruitful field which

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if duly cultivated, would yield glorious returns. We have only to direct attention to what Dr. D. F. Lincoln is accomplishing in this department by his talent and exemplary zeal, to indicate the important character of this work.

Health organizations and these popular sanitary conferences. The value and influence of these can hardly be over-estimated, for while they demonstrate, gentlemen of the State Board of Health, the efficiency of your faithful sanitary work throughout the State, and which receives a hearty recognition and response from other like associations all over the country, they cannot fail to stimulate a spirit of laudable zeal to emulate your successful efforts, not only among physicians, but among those representative citizens as well, who have encouraged us with their presence here to-day.

The limits of my paper will not permit me to discuss at length, were I even able so to do, the popularizing influence exerted by the sanitary organizations throughout the United States.

Incidental to this part of my subject it may be well to state something of the aspect of sanitary aid in southern Minnesota, and I confess to experiencing a feeling of personal mortification when compelled to state that there is almost nothing being done in the extreme southern and southwestern part of the state, to advance the sanitary cause, and must plead as some sort of an excuse that we have there a section of country remarkably exempt from all forms of zymotic diseases in epidemic form. The diseases there are for the most part subacute and chronic affections, notably catarrhal and rheumatoid, and chronic female affections ; also some typhoid fever and pnumonias, though seldom in an epidemic form. We are almost entirely free also from malarial affections. You can readily perceive, gentlemen, that in such a locality it is difficult to get the people interested in sanitary matters. In twelve years' residence in Winnebago City, I have never seen an epidemic of any disease prevail there, save Rötheln thelus and catarrhal fever, or influenza. There has recently been a small pox scare about Blue Earth City, twelve miles south of us, enabled us to vaccinate some, and which stimulated the doctors and which the people to a brief spasm of sanitary effort; but it was soon over, and an apathetic relapse took hold of them again.

We have, as some of you are aware, no health organization at Winnebago City, where I reside. There is, I believe, a nominal health officer at Blue Earth City. If there is any other sanitary organization in that part of the country, south of Mankato and

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west of Albert Lea to the state's line each way (*i. e.*, s. and w.), I am not aware of its existence.

Another reason for sanitary indifference in that part prevails in the fact that we have very few physicians, comparatively speaking, and no organized medical societies in that rather sparsely settled district, embracing the counties of Fairbault, Martin, Jackson, Lyon, Pipestone, and some others lying for the most part along the Iowa line and westward to Dakota.

I shall next speak of legislative and executive aid, consisting of two departments. The first relating to financial aid by appropriation necessary to carry on sanitary work in its various departments. The second by enacting and enforcing such laws as will compel both public and private citizens to the performance of their duties in all essentials pertaining to the preservation of health and the prevention of disease. * * * * * *

As an illustration of the importance of preventive means in their various forms, it was stated by our committee on hygiene and State medicine, in their late report to our State Medical Society that "fully fifty per cent. of the deaths in this state result from zymotic diseases which are for the most part preventable." And this statement is in keeping with that of Dr. Billings, for the whole country, as he declared that one hundred thousand die annually from causes which are preventable.

These statements are startling, and demand of us, as a body, much more than we have thus far been doing in this direction, as it is evident to even a casual observer that the sanitary work of the state is being done by a comparatively few zealous men, probably for the most part by only a few dozen; and yet there are in this state over one thousand physicians, and in our State Medical Society about two hundred and fifty members, representing every part of the state.

Here is a lesson for physicians who are indifferent to the claims which sanitary work so imperatively demands of us.

If every individual member of the medical profession could be made to realize that it is largely a part of their professional duty at all times to co-operate with the legally authorized sanitarians, by educating the people, as far as in their power lies, in regard to the nature and modes of prevention of zymotic diseases, urging vaccination, isolation and disinfection, when epidemic or contagious diseases are prevailing, and advising them of the susceptibilities of certain articles of drink and diet to absorb and communicate the "materies morbi" to the healthy; notably water, milk, cream, butter,

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lard, meats, pies, vegetables, et cetera, it would soon bring about a popular reform in this direction.

To sum up them briefly. The principal obstacles in our progress in securing the necessary "Popular Aid in the Prevention of Disease" may be expressed in these four bad words, *avarice*, *ignorance*, *indolence*, and *indifference*. And the best means I am able to suggest to surmount them can be found in the two *active* words, *agitate* and *educate*.

Agitate in every individual home; in our schools; in our medical and health journals; in our societies, both medical and literary; in newspapers; in popular magazines; in the churches; reform our local health boards; in our legislative halls; by every avenue accesible to us, until the people are educated to an understanding of its practical and beneficent aims, and are willing to lend their aid in the accomplishment of its high purposes.

When we can get the proper sentiment fully enlisted, the battle will be half won; but let us ever remember that the accomplishment of this object devolves to a very great extent on the physicians of the country, and their compeers in the various health boards. Not to be attained by fitful or spasmodic effort, but by a continuous, earnest and unceasing endeavor.

Let us, then, go boldy forward in this work of this our highest mission of endeavoring to *prevent* as well as cure disease.

Let our motto be "*Sanos Sospito Œgrosque Sano.*"

PAPER.

Subject: The Experience of a Country Health Officer in Dealing with an Epidemic of Small Pox.

By Dr. James H. Dunn, Health Officer of Shakopee, Scott County.

On the 26th of June last, a vague rumor reached Shakopee, that a boy had died in a German family twenty miles away of a disease which the Catholic priest said was small pox.

I consulted with our citizens and they agreed that the matter ought to be investigated; and in less than an hour I was on the way to Cedar Lake where the family reside. On arriving six cases

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of malignant small pox were found in one room. No one knew how or where the first case had been contracted, and although the family had for several days known the nature of the disease, they had kept it a secret until impending death demanded the presence of the priest.

They had invited neighbors in to see the sick, and sent the younger children to school until a week before, when the chance word of a neighbor caused the directors to suspect some contagious disease and to suspend them.

About the pest stricken house, so lately the scene of a hurried midnight funeral, all was going on in a lively manner. Mr. S. the father was in no way lachrymose, but rather claimed to think lightly of small pox, wanted no assistance, thought there was no danger, intended to travel to neighboring houses as usual. Two neighbors were working away as usual on his new house. Elated with whiskey, they loudly declared themselves in no way afraid of small pox. This bravery inspired of alcohol, ignorance and carelessness cost one his young wife and child, the other his eldest daughter.

The State Board of Health was informed of the outbreak, and the Secretary was promptly on the ground. On the 28th the Secretary investigated all the reported cases and with characteristic push and vim after an eleven hours ride over bad roads, succeeded in visiting and notifying the supervisors of each of the three towns of their duties, commanding them to at once organize town boards of health, and appoint health officers. I volunteered to act in the latter capacity until the boards could meet and formally elect an officer, a procedure which takes the average town board of our county several days to accomplish, since they often live far apart, are busy at farm work or sometimes absent from home.

On hastily surveying the field I found that small pox already existed in six families in the adjacent corners of these towns; that no vaccinating had been done for the past twenty-five years in the community. Several persons had been exposed. Luckily it was a time of year when there was very little intercourse among farmers. Had it occurred in winter, through visiting, travel, schools and churches, together with the usual lack of ventilation, I have no hesitation in saying that instead of six, the number would have included nearly every family in the three townships, and many in two or three towns and villages, before we arrived on the ground.

Red flags and notices were posted at each of the six infected houses; guards stationed over those showing any disposition to

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disobey orders; and sentinels were also placed at each end of the Fairfield road, who demanded of all passers the health officer's pass. My brother who rendered me valuable assistance all through the siege, with fresh bovine lymph, vaccinated every family in the community, beginning with those most exposed. I make my daily round by the road about twenty miles, visiting patients, carrying messages, running on errands, (of which this little community suddenly shut out from the world at the busiest time of the year for farmers, had a multitude), brought groceries and medicines, boarding myself in a school house, caring for my own team, with the only excuse of a barn a mile away, which distance had to be walked through deep mud three or four times a day. A pair of blankets would have made a passable bed upon the floor, had it not been for the myriads of mosquitoes that nightly swarmed up from the adjacent swamps. Haying was at hand and harvest approaching; it was almost impossible to hire any one to quit his own work; everybody feared the disease as death itself; no one could be found to do anything. Then there was no money to pay. If one were ready to work, the assurance that he would probably be paid sometime was not inviting. Five of the six houses, after a couple of weeks, became veritable pest houses, and the sick were suffering for assistance and food. My leisure time was spent canvassing for a nurse. Reports of brave and philanthropic souls, desirous and ready to assist, were not wanting, but investigation proved it to be either the blarney of some drunkard, or the boasting of distant persons who saw fit to reconsider the rash proposition. I found only complaints of my being allowed to travel after exposure to the disease.

On the 13th, Mrs. Kline and infant died, no one could be found to bury them; at last they came to the school house and awaking me asked if I would not ride six miles to the burying ground and assist the husband to bury his wife. I had been out in the rain during the night and was very tired but could not refuse. Mounting a farm horse, I rode to New Market, arriving just as Mr. Kline was lowering the coffin, all alone, into the grave. The next night we had to drive eight miles for nails to make a coffin for another victim.

It was on the 13th of July, before all the boards had met and appointed me officially as Health Officer. The last board performed their duty only after I notified them of my intention to prosecute them for neglect of duty, should they fail to meet at once. It is only just to say however that some officers, notably Messrs. White and Cassidy were very efficient. Great complaint came up from every side that it was going to be a heavy expense to the towns,

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still, every cent of cash that was being used was advanced by myself. Affairs were daily getting worse. In five of the families nearly all the members were attacked, and the few well ones were exhausted. We must have help. I telegraphed the Secretary of the State Board; the same evening he came to Shakopee, and next morning was on the ground. He laid down the gospel, so to speak, in a manner that the board could not mistake, authorized me to get whatever the patients needed and referred us to Dr. Leonard for a nurse. The doctor sent us Mr. John Lunberg, who did us excellent service as cook, nurse, errand boy, &c. At this time I was heartily disgusted with the community. Outside parties were quarrelling about fancied expenses upon the town, and spread far and wide a report that the disease was not small pox, but only a hoax gotten up to scare people into being vaccinated. Distant towns, like Shakopee and Lakeville, were cursing me for passing anybody under any circumstances from that part of the county. Those within the quarantine tried all ways to get through it, even on such frivolous pretexts as to go to a circus. Within the pest stricken families in some instances the most monstrous selfishness was exhibited. An aged mother refused to see her daughter who, herself and twelve children sick, had no nurse, with a husband dead drunk at times. One man wanted the town to pay him the five dollars per day allowed the nurse. Some were ridiculously afraid of the disease. A livery man refused to drive me past an infected house. A business man of general intelligence ordered a pound of sulphur to be burned in the woods on the town border. Others stupidly insisted on exposing themselves and the public. I found it necessary to collar a tramp in order to prevent his entering a room containing six cases, to get a match, notwithstanding he had been twice informed of the state of affairs inside. When cleaning-up day came, great opposition was made to the burning of such things as could not be safely disinfected. At last, on the 12th of August, the last cases having shed their scabs, the houses were thoroughly fumigated, contents disinfected, attendants and patients bathed, fresh clad and given their passes. One old man with hydrophobic tendencies, when ordered to bathe, appeared with a pint of water and a suit of clothes from the infected house. My brother withheld his pass, until a cheap suit could be brought from the nearest store, then ordering a wash-tub full of warm water, with soap, administered an astonishment to the old gentleman that nearly rejuvinated him. After getting his

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pass, he remarked he had not felt so well in years. Apparently it was the first thorough bath since his birth.

The quarantine was now removed, but families warned to stay at home for two weeks more. There were thirty nine cases of Variola and Varioloid with nine deaths. It was literally stamped out with quarantine and vaccination. The glorious benefits of vaccination were plain throughout—but they were so conspicuous in the case of Mr. Lannigan's family that I cannot refrain from giving it a passing notice. There were ten persons in the family. My brother vaccinated them all on the 28th; two days later Katie became sick with small pox, and for three weeks night and day the other members of the family were in the same room. *Not a single one took the disease.* Their vaccinations all worked charmingly. Look upon this picture, then upon this of the Lanser family of ten persons and similar ages respectively. Of the eight children never vaccinated, all had malignant small pox. The mother vaccinated in youth had very mild Varioloid, and the father who had had the disease in youth only escaped. Three fine young men died, four girls recovered frightfully scarred, and the only surviving son lost an eye. Of the three infants who took the disease, two unvaccinated died festering masses of confluent small pox. The other vaccinated prattled and laughed in its crib by the sick mother with but eight vesicles on its whole body.

During my forty-four days experience, I rode about 1200 miles over roads often made dreadful by heavy rains, without a single warm meal of victuals, except once in a week or ten days when in Shakopee for supplies; slept on the school house floor, spending on the average one hour per day in rooms reeking with the small pox stench, proper ventilation being superstitiously avoided, against orders in several instances.

After the siege was over I found all disarranged at home. My practice neglected for six weeks at the best time of year, patients were loudly complaining. Visions of crooked limbs and malpractice suits haunted me lest the four fractures undertaken before the outbreak should do badly from want of attention. My driving outfit, harness, saddles, carriages, etc., and much borrowed from friends was scattered over the twenty-four miles of territory between Shakopee and New Market. My office overhauled by occasional hurried midnight visits was a chaos. Instruments and appliances misplaced or lost. Just preparing for a collecting campaign when the attack occurred, I was not able to collect a dollar for two months, and as I furnished what little ready money was used, I was placed

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in a condition financially which embarrassed me for months. Although five months are now passed, health officer, grocer, druggist and even nurse are unpaid. Whatever had to be paid cash, was paid by myself. After a loss of two days time with team and the services of an attorney, I succeeded in the course of three months in making a settlement with one town and received their orders. Now a day's time was spent looking up the treasurer who refused to sign the orders. After four weeks further negotiations, he concluded to sign them. I can raise no money on the orders without submitting to a very heavy discount. I have never been able to get the other boards to meet. No one can guess when any of us will get cash for our services. It takes months to get a town board to meet, settle and give orders. It then takes sometimes much travel and perhaps a law suit to get a contrary treasurer to do his plain duty and countersign the orders that they may bear interest. Then at some subsequent election the people must vote a tax to meet expenses. The process is so long, uncertain and troublesome that such a bill is not worth fifty cents on the dollar.

My first impression in dealing with country boards of health was, that our country health System is a farce; that such men unused to business, slow, careless and sometimes ignorant, were only a hindrance in fighting disease. But further experience leads me to believe that while the State Board has the power to compel them to act, and has so efficient and lively a Secretary to punch them up, they constitute the best machinery that can be invented for the purpose, especially if the medical man does his full duty in looking after them. And with a few changes I believe the present system will prove an excellent one.

First, I believe the health officer should be empowered to serve papers, and to make arrests. There was much force in the threats of parties that we could not arrest them since no officer would approach them.

Second, some plan should be adopted by which the Board of Health might raise money for current expenses at once. No nurse I think will wish a second time to enter a pest house after his trouble and waiting to collect the few dollars earned with little pleasure. Of course this is an exceptional case since it is rare to find outbreaks 20 miles from a supply point.

These meagre notes are presented in no wise as a complaint of the hardships necessarily incident to such an outbreak under like conditions. I do not wish to appear here either as a grumbler, or to publish the trials of a few weeks of hard work voluntarily under-

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taken. The State Board and the Health Officer did only their duty and will probably in time be paid for their services. My desire is simply to call the attention of the public to some defects in the present methods of dealing with such outbreaks, that those in authority may be induced to reform the present machinery; that in the future disease may be the more efficiently combated; the health of the public more watchfully guarded; and the unfortunate sick cared for more skillfully.

PAPER.

Subject: The History of an Outbreak of Small Pox in a Rural District, by the Health Officer in Charge.

By Dr. E. J. Brown, of Minneapolis, late Health Officer of Montgomery, Le Sueur County.

MR. PRESIDENT:—At the request of Dr. Hewitt, Secretary State Board of Health, I have prepared a brief account of my experiences as Health Officer in charge of small pox at Montgomery, Le Sueur county.

I was awakened at midnight of April 21st, last, by Dr. W. H. Leonard, of the State Board of Health, who asked if I would go fifty miles into the country and take care of some small pox. Answering in the affirmative I was told to take the first train for Montgomery, which would leave at 8 a. m. Arrived at Montgomery at noon in a drenching rain storm; reported to Mr. Hovorka, Town Clerk, from whom I learned that the pest house was back in the woods some six miles, over almost impassible roads, and that no preparation had been made for my reception. I soon found I was in the worst scared community it had been my fortune to see. Nobody knew what to do or how. The City Council was called together, and I was introduced to the Mayor and other prominent citizens. The council resolved, "that there was small pox in town, that a physician was needed, that they had one, and that they would send him to the pest house." At my suggestion that I must have board and lodging, all declared at once they could not accommodate me in town after I had been at the pest house.

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All were equally sure that none of the neighbors of the infected family would admit me to their houses. One said I could sleep in the granary, another that Cooney was a good cook and would be willing to go with me, as he had had small pox. The latter, an exceedingly dirty and dissipated looking blacksmith, appeared and admitted that his skill was limited to cooking beefsteak. After a good deal of foolish and fruitless talk it was decided to establish me in a furnished log house, which the owner had deserted through fear, with John Cahoe, a young Irishman who had cooked in the pineries, as attendant. I was afterwards told that the original plan of the authorities had been to have a Bohemian, who could not speak a word of English, drive me out to the pest house and leave me to shift for myself, doubtless expecting that doctor and patients would all die together. At 5 p. m., after five hours spent in arrangements which should have been perfected before my arrival, we started on our journey through the woods. As there was said to be only one woman in attendance upon the sick, and the authorities declared it was impossible to get nurses in town, I directed that Dr. Leonard be telegraphed to send nurses and virus. I was somewhat selfishly anxious for the virus, as I was not sure that I was myself protected. We arrived at our destination at 8:30, the horses having been taxed to their utmost to draw myself with my supplies through the mud which often reached the axles. We forced the door of the deserted shanty and took possession. As soon as possible I visited the pest house, which was a frame building some sixty rods from my quarters. Approaching the house I looked in at the window of the only lighted room, and saw two beds, one of them being on the floor, literally full of human beings. As I approached the window with my lantern the old woman slowly arose from the bed on the floor, and before she could open the door, after my announcement of my mission, began in most piteous tones to bewail her misfortunes, and the cruelty and neglect with which her family had been treated by the people of Montgomery. On entering I found that one small room contained all the cases, four males and three females, with ages ranging from twenty-four years to twelve months. The only attendant was the mother, who was worn out, sick, and half crazed. She was quite feverish and I feared was coming down with the disease. The four older ones were advanced to the stage of suppuration and their almost black faces, presenting a well nigh unbroken suppurative tract, leading me to suppose I had malignant cases to deal with; the horrible stench, the filth and the wailings of the mother, formed

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a combination of circumstances as trying as it was novel. The other cases were milder and less advanced; the babe showed only the scattered eruption of varioloid, but was very low and had the appearance of being starved. One girl of four years was in semi-coma, would not eat and never fully rallied. Mrs. S. (the oldest female) whose husband, the first case, had died eleven days previously, had miscarried two days before my arrival, being two months pregnant. The cases had been sick about nine days without physician, medicine or proper food, and with only such care as the sick and half-crazed mother could give. The throats of the older ones were so bad they could swallow no solid food, and they had nothing but flour, gruel and alcohol. There was no wood, all having been burned and the fire nearly out. It was Saturday, and the old lady had been obliged to gather and prepare all the wood burned since Tuesday, when an old man whom the authorities had sent there had wandered away in a crazy fit, to which he was subject. My cook and driver cut some wood and I carried it in.

Good Father Cullen, of Kilkenny, had visited the family daily and had tried to procure some milk of the neighbors, but without success until after my arrival. Sunday night a grown up girl who had run away to St. Paul returned sick with Varioloid, and not being very ill, was very useful in caring for the others. That day my cook, Cahoe, went to a neighbor's two miles distant and succeeded in getting four quarts of milk. For some days I tramped through the woods in the deep mud, seeking for milk and vaccinating the people. Few people had milk. One man refused to sell milk at ten cents per quart; another would sell a cow, but must have his money down, and this when the sick were dying for it. I scared one man by telling him the milk would be a curse to him if he took a drop in his coffee when the sick were in such need. Much objection was made by some to having their children vaccinated. It was accomplished in some cases by threats, in others by persuasion, and again not at all. One man whom I caught away from home with his boy in an infected house only submitted after I and the boy had promised not to tell his wife. One old Irishman fainted when I vaccinated him, from fear, not as he afterwards confessed, of the vaccination, but of the small pox doctor. The business of vaccination was made doubly interesting by the almost universal prevalence of the itch.

A fourteen year old boy belonging to the infected family was at work for a man in the town of Erin, Rice county, and had not been exposed to small pox, but the authorities of that town forbid his

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employer and all others to harbor the boy under heavy penalties. I directed his aunt who had been providing him with food and shelter in an outhouse, to take him in at my risk. The babe died Tuesday, the second day after my arrival, from starvation and neglect. The poor widowed mother laid it out. I rolled the body in a sheet, placed it on a barrow, and wheeled it to the grave in which I deposited and covered it. The little girl four years old died two two days later, and was buried by the nurse, John Lunberg, who had arrived the day before from Minneapolis, sent by W. H. Leonard, and who did faithful service. Neither of these children should have died. I believe they died purely from neglect for which mother and physician were not responsible. I requested of the authorities a saddle horse for my own use. The town clerk replied "they could not furnish me one as their people did not think I had better leave quarantine," or words to that effect. The opinion I thereupon expressed of the authorities of that town is on file in the clerk's office and need not here be given.

Wednesday, April 26th, I was cheered by a visit from Secretary Hewitt, who assured me that the State Board would afford me all the assistance and backing in their power, that my orders for a horse as well as all other necessaries should be honored, and that I would probably have no further trouble from the local authorities. It is proper to state that these promises of co-operation and support on the part of the State Board of Health were fully met. Perhaps I ought not to state that it was current report that our honored Secretary was himself arrested and quarantined on his return to town. With the arrival of our nurse and a cow furnished at the request of Dr. Hewitt, by Mr. I. W. Sheehy, of Montgomery, who also rendered me his debtor in various ways, we were able to make our patients very comfortable, and though three of them were desperately ill, all went on to recovery, as well as two other cases who were taken down later.

Our quarters were so completely overrun and taken possession of by the numerous vermin as to render them totally unfit for human habitation. Should I give the statistics of midnight slaughter as found in my notes I fear my reputation for veracity would be destroyed. My cook soon retreated to the hay loft, but was already so demoralized that at the end of two and a half weeks I was obliged to dispense with his services. After another week during which I did my own cooking, I was myself forced to make an unconditional surrender of the shanty to the enemy. The people of

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Montgomery had now sufficiently recovered from their fright so that I was permitted to take up my quarters at the hotel. I regret that I have lost the notes of a statement made to me by the Gillan family of what had occured previous to my arrival. The main facts, however, are these. George Smith having arrived from Ontario two weeks before, was taken sick with small pox, and after about three weeks illness died, April 11th. He was seen twice in the first of his illness by Dr. Woods, of Montgomery. Dr. Woods, to whom, with his estimable wife, I am indebted for much kindness, diagnosticated the disease as small pox, but was not allowed by the people of the village to again visit the case. After the case had been pronounced small pox, members of the family went to Montgomery and telegraphed to Minneapolis for a physician, but without obtaining one. The family was then quarantined; they were told they would be shot if caught off the farm, and were promised a physician, but none was provided, and the man was allowed to die without an effort being made to save his life. After his death a man was sent there by the supervisors to bury the remains and disinfect the establishment. He burned nearly everything in the house, clothes, furniture, feather beds, crockery, tin dishes, a shotgun, etc.

A messenger was put upon the road, through whom the authorities communicated daily with the family. The rest of the family became ill April 13th, two days after Smith's death, but no physician was provided till I went there nine days later, April 22.

In conclusion let me state a few facts about the financial status. The Montgomery supervisors manifested a disposition to obstruct as far as possible the liquidation of the small pox claims, and for a part of my claim as well as those of other parties they refused, by advice of their attorney, to issue orders, with the avowed object of saving the interest to the town. For the same frugal purpose the town treasurer declined to certify to the fact of there being no money for the purpose in the treasury, and I was obliged to employ a lawyer to teach him his duty. The town clerk now writes me that the commissioners of the county of Le Sueur, by advice of county attorney, have disallowed the whole claim of the town of Montgomery, and that the county will be sued by the town. In justice to Mr. Hovorka, the town clerk, I ought to say that he showed a disposition to do what he could to support me, but he was opposed, in every way by the dense ignorance, superstition and fear of the populace, and was obliged to act for the most part without the encouragement or support of the town board. As a single item of the many I could mention showing the utter mismanagement of the

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whole business on the part of the authorities, let me instance the following: During most of the time I was located at the shanty, a messenger was employed at an expense of two dollars per day, to carry communications from myself to the town clerk and bring supplies; but he was obliged by the city council to stop outside the town, where he was met by a policeman at an expense of two dollars per day, who reported to the town clerk. Had I as health officer had entire charge of the business, to act at my own discretion, I doubt not the expense would have been at least one-third less.

I would respectfully suggest that the ends aimed at by our "Contagious Diseases Act" could be much more satisfactorily secured by making the local health officer subject to the state board, and wholly independent of town boards, his accounts to be audited by the state board and paid from the state treasury, after which they could be charged against town or county, as the case might require.

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319 Nicollet Avenue,
Minneapolis.

Dec. 2, 1882.

HYGIENE IN COMMON SCHOOLS.

What Shall be Taught and How Much?

By Hon. D. L. Kiehle, State Superintendent of Public Instruction.

This entire question is determined by what we expect to accomplish by introducing this branch into our common schools; because the end must determine the means. How a thing should be done will depend entirely upon what we have set out to do.

Do we wish to make scholars, scholars who can tell either much or all of what is known of the human system? Or is it doctors who can lecture, diagnose, and prescribe for others?

Each of these suggests methods and matter peculiar to itself.

I apprehend, however, that in our duty to the masses of youth now under instruction in our common schools, we expect to do neither of these things.

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The end set before us is to show each young person how to care for his body, so as to maintain the highest degree of health, and how to economize strength and vitality for a long life and great labor. In other words we wish to give him a general understanding of the mechanism and functions of the human body and its parts; a knowledge of the influences of external elements and personal habits and exercises upon the conditions of the body, and then a power of self inspection and correct judgment of what the conditions of the body are, their causes or their remedies.

With this general statement of what we wish to do, I proceed to speak more in detail of plans and methods, and to notice what to me seem to be mistakes in customary methods.

First. Then we ask for a *general* knowledge of anatomy and physiology. I say *general*, because it is not possible to get more, without taking time that belongs to something else. A general understanding of the whole, with the relation of parts to each other, is of vastly more practical advantage than an excessively detailed knowledge of some one or a few parts.

Then, too, more is not necessary. If we should select a hundred persons who are careful with themselves, and are with success preserving their bodies in health, if we question them we shall find that very few of them have more than this general knowledge.

But, mark you, let it be a *knowledge* of the *human system*, not memoriter book learning, rote lessons of what some one has printed in a book, but knowledge that is gained by a study of the system itself.

In the first lessons of such study, we shall find the class enthusiastic in examining and comparing various species of the vertebrates. Bones, skeletons and skulls, become curious and precious to them. For them they scour the fields and bring treasures of them to the teacher.

Soon we shall find them as interested in the physiology of chickens, sheep and calves. From the shops the boys bring parts for dissection and examination in the school-room. These ligaments, muscles and organs, they look at and talk about till they forget that they have a book to study.

Second. We must have a general knowledge of the chemistry of air and food, and how the body is built up and made strong and warm by the proper use of them.

This, too, be it remembered, must be a knowledge of the things themselves, and not a memorizing of what some one says of them. The teaching of this subject that will be of some account will in-

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troduce the simple devices for illustrating the phenomena and products of combustion, the chemical properties of oxygen and carbonic acid, and the physical properties of water air. Finally, the most important part of the instruction is in the cultivation of a habit of careful self-inspection and self-knowledge, with an appreciation of what health is worth and what care the body requires, and especially with a disposition to conscientiously observe every law as it is known.

I emphasize this as of the first importance and demanding special attention, because it is as easy to study physiology and hygiene without the least thought or disposition to apply the learning to one's own practice, as for a sinner to learn by rote the ten commandments.

Besides, good judgment should be cultivated; because it is not possible to frame a set of rules that may be followed by all persons at all times. "One man's meat may be another man's poison." Nothing can take the place of personal good judgment.

This, it must be admitted, is a difficult work. It requires the best teaching talent. But it is in entire harmony with what is known as the new education, which is no more or less than a modern recognition and application of some very ancient and self-evident principles of mental training. This declares that the training of the powers of observation and judgment is of the first importance and to be estimated immeasurably above memoriter acquisitions.

In this we shall find the work already done, helpful in that it is in the same direction. The pupils have been learning to observe physical parts and properties outside and around them. They have become interested students and close observers. It now remains to direct this study of the pupil in upon himself. Just how this is to be done can no more be detailed for a mechanical observance than to give the subject itself mechanically. The good judgment of the teacher is an indispensable condition. The teacher, then, least of all, must not be a mere bookman. He must himself be an intelligent observer with good learning. His disposition will be continually to dispose his pupils to notice the effect of objective conditions upon personal health and comfort. As, for example, he finds the room close and overheated. He stops recitations and study, and calls the attention of the school. He asks, and is told that many heads ache and many faces are hot and flushed, and that the feet are cold; hard problems are unsolved, and difficult lessons are unlearned.

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Calling attention to the condition of the room, they observe that the air is hot and almost stifling.

"Now," says he, "close your books and stand erect in your places; while I open the doors and windows." Then follows a pleasant exercise in calisthenics. "Now, close the door, and remember the candle that burned low in confined air. We will now have a song, and again try our hard tasks."

This is lesson No. *one* in practical hygiene, and will not be soon forgotten.

If this is a correct view of the proper method of instructing the young, it follows that it is neither a short nor an easy task. It cannot be done in ten weeks or in fifty lessons. It must be pursued continuously for years, with more or less attention during all the years of school life.

I am also of the opinion that the best work can be done in oral lessons to the entire school, and that in most country schools the text book and class recitations might be dispensed with.

In this discussion I have given my view of the rational and effective method of teaching hygiene in our schools. By it we have pupils with intelligent views, conscientious convictions upon, and good habits of indulging temperately and with discretion in what is harmful only in its excess, and in scrupulonsly avoiding what is either harmful, per se, or dangerous in its tendencies.

As to how such teaching as this is to be secured for our schools, I should say that it must be by the united effort of those who are training teachers to observe rational methods in all their work, and the profession which although its gain is by the ills of the body, have, with philanthropic spirit, undertaken to show men how to escape by prevention, and save themselves from sickness and the doctors.

In brief, we hope to gain an impulse in the right direction by by the presence, in our schools, institutes and associations, of such gentlemen as are interesting themselves in the problems of the day.

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METHODS AND RESULTS OF PHYSICAL TRAINING IN SHATTUCK SCHOOL.

By Rev. James Dobbin, Rector of Shattuck School, Faribault.

The subject assigned for this paper is on the practical side of the work aimed at by this association. It goes back of the causes that led to the appointment of boards of health. We have come to recognize in fact that the public hygiene has to do not merely with the prevention of sickness, the spread of contagion, the abatement of the virulent diseases that from time to time scourge towns and neighborhoods with their poisonous breath. We may not even be content with removing the causes that produce these diseases. We are beginning to think more than formerly of the fact that our bodily vigor, or health if you please, is subject to cultivation. Not only should the proper conditions of health, such as pure air, good water, wholesome food, suitable clothing, cleanliness, and needed rest and recreation, be made widely known, but also the duty of training and developing the *physical powers* in the best manner possible. We can guard our children, if we will, against the inroads of disease by filling them with vigorous, robust health. Disease, like plant life, must find a congenial soil, or it will not thrive. If it becomes malignant in a given case, it may find easier victims because of a reduced vitality, as well as from foul air, or uncleanliness.

The normal condition of man is health. The whole organism of the human body is designed for the proper assimilation of food, and the development of all its parts toward a perfect type. The laws of growth, of nutriment, and of the active use of the body, rightly understood, are intended to give the greatest amount of vitality, and so the greatest resisting force to disease and decay. Whatever hereditary or individual weakness we may have, is due at some time, and at some point in the line of descent, or of our own mode of life and training, to the persistent violations of the laws of our being. We have interfered with the healthy actions of these laws. We, or our forefathers for us, have not lived to the best

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purpose, and an enfeebled constitution, a predisposition to disease, or malformations may be the terrible penalty.

Much can be done to aid Nature in this healthy development by systematic culture. In the school of which I have charge at Faribault, we set out with the principle that no boy can become the highest type of man, fitted for all the duties and conditions of life, nor able to live his best, unless he is symmetrically trained in all the parts of his being. If we would produce the best results, we must not overlook the fact that every boy has a moral and spiritual nature, as truly subject to training, to culture and education, as the intellectual. Nor on the other hand must we fail to provide proper training for the body. It is not merely a matter of physical growth. Unless that growth be in a healthy manner, such as shall give vigor and health to muscle and nerve, sinew and bone, it is impossible to develop either the intellectual or the moral nature to the fullest extent nor to the best effect. In the purest type of man the three grow together. God has bound them too closely for us to separate. And any system of education that provides merely for intellectual culture, must from the nature of the case fail in a great measure of its object.

True religion, therefore, as well as true philosophy makes it the duty of educators to unite with the education of the intellect and the soul the care also of the body. We have not done the best we could for our children, nor have we given them a complete education, no matter how cultured they may be in books, nor how reverent in worship, unless with it we have used every necessary means to give them healthy, robust bodies; unless we have taught them some of the laws of health and of its preservation, and have trained their bodies into the habits of vigorous and pleasurable exercise.

From this conviction, our department of physical culture is put on a level with others. So far as we can consistently with the individual freedom that belongs to the growth of true manhood, we set out to make all the habits of life subject to instruction, and a wise restraint. The hours of meals, of study, of recreation, and sleep, are uniform and regular. The exercise is partly voluntary, and partly obligatory. A certain amount of it at fixed times, and under the direction of an instructor, is as much insisted upon as study and recitation. The one cannot take the place of the other. The one is done better because of the other. The indolent are not permitted to neglect the exercise that is necessary for health; while those who require and enjoy a large amount

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of activity, are provided with safe and convenient means of working off their surplus energy. To stimulate as far as possible voluntary exercise, one of our largest and most costly buildings is devoted to this purpose. It contains a well-furnished gymnasium, bowling alleys, drill hall, bath-rooms, water closets, &c., and is built, and furnished with a view to entire freedom of use. For comfort in cold weather, it is always warmed by steam, lighted by gas, and is open for constant and unrestrained use in all the hours of recreation.

Perhaps that feature of physical culture which has done more than any other to give character to the school, and that from which we have thus far seen the best results, is the military drill. We have made use of it as a means of culture and discipine of urteen years. It is in no sense a pretense or makeshift, nor advertised for effect. Any one who has seen the parade near the close of the academic year, must have been convinced that the proficiency reached, was the result of weeks and months of careful and thorough drill. The erect carriage, quick, uniform movements, and ready obedience are the result of work on the part of the cadets, no less than of the faithful and constant instruction of the drill master. Forty minutes are devoted to this exercise at the close of the morning study; always in the open air when the weather will permit. No one is excused from it except for sickness or disability. It is made as much a matter of course as a recitation. The manual of arms, the squad, and company and battalion movements, give a great variety of the very best exercise, without the danger of overdoing or injury. When the weather is bad much of the same work is done in the large and well-warmed drill hall.

Besides this, and supplementary to it, we have recently employed an instructor in gymnastics. A graduate of Amherst College, and somewhat of an enthusiast in physical culture for its wholesome effects. He has begun the development of a system which is probably the best yet adopted in any of our schools or colleges. He is not a mere professional performer. The gymnasium is made an instruction room, as well as a place for exercise. The boys are taught the use of the muscles and the best methods of adding to their strength and size, and are shown how to perform skillfully and safely on the various kinds of apparatus. In the evening also the entire school is exercised for half an hour with the dumbbells. As exercise and not the straining of the muscles is sought the dumbbells are made of wood, and weigh only from 10 to 15 ounces. The movements are marked by music on a pi-

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ano, and the sight of more than a hundred boys, with coats off, in regular line going uniformly and together through every variety of movement of arms and body, is interesting and entertaining; while the effect upon themselves is more than sufficient to remove the dullness and weariness of a day's honest work in the school-room.

Of the results of this I can for the present only speak in a somewhat general way. We have not till the present year, taken pains to verify our observations of the benefit by actual measurements. In our present plan a record is made of the age, weight, height, extreme reach of arms, chest, girth, compressed and expanded capacity of lungs, girth of arm and forearm, &c., of every boy when he enters the school. Similar measurements will be made just before the close of the school year, and by comparison the growth in each particular from September till June, will be at once seen. We shall then no doubt be able to give some interesting facts.

But for the present, as I say, I must content myself with more general statements of results. These we regard as eminently satisfactory. The influence upon the health, growth, and general appearance of the boys is quite marked. We can hardly be said to have any real sickness. During the history of the school for sixteen years, numbering as it has much of the time a hundred or more pupils, we have not had a fatal case of illness among them. There has not been one case of diphtheria, and but one of typhoid fever, that was not brought there in the system. Many who have been sent to us feeble and sickly have become robust and healthy. Boys unnaturally fleshy become muscular and strong. The round-shouldered are straightened up. Between the military drill and the gymnastic training every part of the body is moderately and uniformly exercised with the same regularity and method as the faculties of the mind. The limbs grow larger and stronger; the chest expands; the body becomes more erect and well-proportioned; the movements easy and graceful; the step firmer, and the personal appearance more manly and self-possessed.

The effect upon the health and happiness of a boy so trained cannot be questioned. Not only is he less subject to disease, but being made more vigorous and energetic, he is more capable of mental and physical improvement, at the very time when all impressions are the most lasting, and when good wholesome effort will give the greatest impetus to the further growth and perfection of the natural powers.

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It does not always appear that the healthiest boy is the best scholar, but it stands to reason that any boy will be a better scholar, as he certainly will make more of a man, if he is so trained as to be in the best physical condition his constitution will allow. In no other way will he have the advantage of all the nervous energy possible for his mental work.

No boy can have keen, clear intellectual faculties, when physically he is allowed to sink into a dull and listless condition. A little vigorous, well directed exercise in fresh air, whether it be with the musket, the Indian club, or the saw—any effort that moderately expands the muscles, quickens the circulation, and deepens the breath, has a wonderful effect in clearing the cobwebs from the brain and giving life and force and enjoyment to mental operations. We find, therefore, as every instructor will who shall systematically sustain some active exercise at regular periods, that aside from the effect on the health, and the physical development, the effort and the cost are more than compensated for by the better intellectual work that follows. The real value will be seen more plainly however in the future. It is just as true in this as in character, that "the child is the father of the man." A thorough education shows its value, not to the boy when he is poring over his studies, but to the man when he comes to take his place among men as a leader of thought and action because he is educated.

So in this education of the body. There may be real enjoyment in the drill and the gymnasium atthe time. Life may have a gust and enjoyment otherwise unknown, when every artery and vein swells with the quickened flow of pure blood. But for its ultimate effect, and its highest value, we must wait until the well-trained boy has become the man, with every organ in healthy action, with every part developed for the perfect fulfillment of its functions, and all clothed with symmetry and beauty, and a stranger to sickness and pain. Then, better than in childhood, better than in youth, the *man* will see that all this training, work or play, was filling him with the store of health and vigor on which he shall draw in middle-life and old age. Then will he see that heretofore he has only been building himself up, body as well as mind, for the years of labor and care. He will stand out above the average of men in physical power and health, and he will act the part of a man, and will do good in the world, as he could not have done, if in training and educating the mind it had been done at the expense of the body.

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I am sure that thoughtful men will agree that if all children could be kept under judicious physical training all the years of their growth ; if their habits could be formed for life according to true sanitary laws, it would do more than aught else for the health of the nation. Indeed we can hardly claim too much or the advantage of a wise and thorough combination of physical and mental training.

You, gentlemen of the State Board of Health, can encourage this, and in so doing can help forward the work intrusted to you by the State. You can stimulate it especially in schools in which the pupils are not required, from the necessities of the case, to take the needed exercise in labor. You can gather statistics of the relative growth with and without an intelligent training. You can encourage the practical teaching of hygiene and hygienic laws in the schools of the State; and in this way can help raise up a race of men who shall not only be more healthy for your wise efforts, but who may become intelligent co-workers with you, in preventing or in suppresing the scourge of epidemic diseases among the poorer and more ignorant classes.

SOME OF THE DANGERS TO HEALTH,

Mental, Moral and Physical, Incident to our Present Methods of School Education.

By Prof. L. B. Sperry, Carleton College, Northfield.

Education of some kind, to some extent, is sure to be the inheritance of every living child born into the world ; and education in the broadest significance should be the great business of life. How to develop the grandest possible manhood in each boy, and the grandest possible womanhood in each girl born into this world, is the most important and pressing problem of society.

I suppose that no sane and thoughtful man will claim for a moment that our present opportunities, appliances and methods are perfect, or that the results of our efforts at education are satisfactory. *Perfect* specimens of manhood and womanhood are not yet in existence ; and, sad to say, but a very few of the millions of

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human beings, past and present, of whom we have any knowledge, are encouraging illustrations of man's ability satisfactorily to educate men.

Indeed, a careful survey of the field forces the conviction that many of the present efforts and methods through which man seeks to educate his children are not only ridiculously faulty, but even fatal to the object sought. Let us for a moment, so far as possible, put out of mind our present aims and methods in *trying to educate*, and study the problem as if it had never been undertaken; as if we had no plans or methods, and must make them *de novo*.

We find ceaselessly crowding upon us multitudes of ignorant and helpless, but rapidly growing and naturally potential, young specimens of humanity. We recognize our duty to help them to develope into a healthy, powerful, and happy manhood ; to teach and to train them to get the most out of this life; and, at the same time, to fit them to enjoy to the fullest extent the endless beyond.

How can this best be done? First of all by recognizing the fact in all the bearings that *man is an animal.*

A careful study of this human animal leads us, quite naturally and conveniently, to classify his activities as *physical*, *mental*, and *moral.* Under the term physical, we include those activities or functions which clearly belong to the *ponderable, material* body.

The physical functions may be classified as those (1) of nutrition, which will include all the processes of digestion, circulation, respiration, assimilation, disassimilation, and excretion; (2) motion, which includes all muscular activity, whether voluntary or involuntary; (3) relation, which includes all the functions of the nervous systems, termed in general reflex activity.

These three groups of functions overlap and interlace each other, and are more or less mutually dependent, which dependence we find increasingly complex, as we advance from the simplest exhibition of nutrition to the most intricate exhibition of reflex activity. But still there is in general, and as indicated above, an order of succession, with nutrition as the primary, fundamental, leading function.

Muscular activity, stands next in order of sequence and importance; while the activities of the cerebro-spinal nervous system come last.

The later and the higher are absolutely dependent upon the lower and more fundamental, while the lower may exist without the higher.

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Man's mental faculties whether they be considered products or tenants of the brain and nervous system are in this life at least dependent for their perfection upon *all the bodily* conditions, not simply upon the brain, nor upon the brain and nerves, but upon *all* the organs, conditions and bodily functions.

Every well-informed man now admits that in this life we cannot have a sound mind in an unsound body. A threefold character of function is seen again in the mental faculties. By general agreement these are classified as (1) the emotional or the sensibilities; (2) the volitional, or the will; (3) the intellectual, or the reason. While these departments of the mind are more simultaneous and interdependent in their development and action than are the three departments of physical function named, I think they naturally develop in the order given—*i. e.*, first, the *emotions*; second, the *will*; third the *intellect*.

A child feels before it wills, and it exhibits both emotion and volition before it exhibits intelligence. A savage is reached and controlled through his feelings more easily than through his intellect. With him, as with children, ridicule is more potent than logic. A fact that diminishes, and may be reversed, as the intellect is developed.

What is termed the *moral* life is more abstract than the physical or mental.

One's moral character at any time is, in a practical point of view, the sum total of the expressions of his *mental* through his *physical* life at that time, (though that may not determine his attitude or integrity toward God).

No education, no character, no manhood or womanhood is worthy of consideration if it does not tend to that happiness which is the result of true living, of a good moral character, and the result of nothing else.

My first object, in what I have thus briefly and imperfectly stated, is to call attention to this thought, viz:—that the *best* methods or processes of education will seek, and in a measure, secure, a successive training and development of the physical and mental faculties of man in the order (though overlapping) in which I have named them, and in a contemporary evolution and establishment of a desirable moral character.

Now, it is an indisputable fact that the work performed by any bodily organ depends upon the nutrition of that organ, and that, other things being equal, the amount and quality of the work is directly as the perfection of the nutritive processes.

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It is also indisputable that all the functions of the body are performed easiest and best when they work in accordance with a *habit*. Hence, the constant concern in early educational work should be to establish and maintain, *as a habit*, the best possible condition and activity of the nutritive organs.

The parent or teacher who fails to apprehend and heed this fact is seriously blameworthy.

Care in this matter necessitates attention to all the known circumstances which influence the digestive and assimilative processes, such as temperature, ventilation, the time, amount and character of physical or mental activity. But notwithstanding the importance of this function the sad fact exists that but little thought is directed to it in our school methods, or family customs; and comparatively little effort is made by sanitarians to establish correct habits in the matter of nutrition.

The average farmer feeds his stock more rationally than he does his children. Customs, thoughtlessly adopted, are allowed to guide us rather than reason.

The muscular system is that through which all the functions of the body find expression, and perform their work. Indeed, the nutritive processes are largely dependent upon the muscles.

All locomotion and all labor depend upon the muscles; all language, whether natural or artificial, depends upon the muscles; all the special senses depend upon muscular tissue for their most perfect action. The muscles constitute the machinery through which human beings are brought into relation with each other and perform all their important duties.

The muscles are the engine, nutrition supplies the steam. The nerves are simply the engineer.

The muscles become healthy and skillful only through daily exercise and careful training.

The blood circulates most freely to the tissue used most, and carries to them its nutrition.

If the muscles be not used enough the blood flows away from them to such organs as are used, and the muscles become *atrophied* while such parts as are excessively used become *hypertrophied* and abnormally active.

Is it not true that in our present methods of education the muscular system, like the nutritive system, is seriously neglected?

True, there are gymnasia or play grounds in connection with most of our schools, but it is equally true that a large majority of students neglect them entirely, or use them so sparingly or so

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spasmodically and unwisely as to make them a damage rather than a benefit, and after the school years are past hardly a sedentary man—though keeping his nervous system at high pressure work—makes any provision for physical exercise. Thus many of our modern efforts at education, like so many efforts of which we learn in history—jump the fundamental and sustaining departments and expend nearly all their energy on the dependent and exhausting departments— *i. e.* on the mental activities. And even here we take the faculty which nature develops last (namely the intellect) and try to develop it first, or independently, thus exhibiting the lack of wisdom which would be displayed by a carpenter who should undertake to build a mansion by first constructing the roof. The result is, comparative failure. Just in proportion as present methods are *pushed* is health undermined and the *best* development of the race prevented.

Instead of beginning with the intellect and ending in weakness, neurasthenia, eccentricity or insanity, educational processes *should* begin with *nutrition*, and through its perfections, reach and develope a balanced, sound and abiding intellect, together with a vigorous and reliable moral character.

The common thought, and the one out of which most educational effort seems to spring, is that mind is simply a tenant of the brain ; that, like the hermit crab in a deserted molluscan shell, the mind gets into some otherwise vacant brain, as a convenient refuge in this life, and uses the brain simply as a home, and, so far as it may, an instrument of service. So long as mind is thus regarded, and so long as educational effort is almost exclusively directed to *mental* training, so long must there be an injury to health, *physical*, *mental* and *moral*.

Says Dr. Mandsley, one of the world's best inductive psychologists : "It behooves us to clearly realize the broad fact, which has wide-reaching consequences in mental physiology and pathology, that all parts of the body, the highest and the lowest, have a sympathy with one another more intelligent than *conscious* intelligence can get, or perhaps ever will conceive ; that there is not an organic motion, visible or invisible, sensible or insensible, ministrant to the noblest or the most humble purposes, which does not work its appointed effect in the complex recesses of the mind ; that the mind, as the crowning achievement of organization and the consummation and outcome of all its energies, really comprehends the bodily life."

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The necessarily short time allotted us for each paper, limits me either to suggestive thought or to dogmatic assertion, and I was almost tempted to close this paper simply with the statement that *any system or method of education that is radically defective must, of necessity, be attended with numerous and serious dangers to health.*

But I trust you will bear with me while I briefly and specifically call attention to a few of the dangers most easily perceived, and to some extent, avoidable, even without such radical changes as the best results would demand. To avoid opposition, I will assume (though I do not hold the opinion) that it is impracticable for the school to undertake to exert any direct or great influence on the alimentation of the young.

Passing that point, all must admit that having control of so many children for six hours daily during five days of each week, the school *is* responsible for their *lung food*—for the quantity and quality of the air which they breathe.

The danger and fact is that children in schools must breathe air that is heavily charged with carbonic acid gas, and various poisonous organic exhalations. Examination of the school rooms of Michigan (and they are the best in the Union) showed an average of twenty-five parts of carbonic acid where there should not exceed eight parts, and, of course, a proportionate excess of organic impurities.

Proper ventilation in this climate is expensive, but we must choose between the expense of such air, and the expense of sickness and weakness.

A second danger in our school customs is that so much time will be consumed in attempts at mental training as to leave insufficient time and strength for muscular exercise.

I am confident that more muscular activity is needed by the young than we are wont to concede. Careful watching of the young of all animals must convince any one that this is true.

A third danger lies in the pressure, strain, friction and wear heaped upon the nervous system through the daily congregation of large number of persons, and especially by the strife and competition resulting from the keeping of class standing, giving prizes, etc.

Too much occasion is given for anxiety and disappointment.

The prize which one wins, *many fail* to win; and the aggregate of disappointment and evil far outweighs the satisfaction felt by the successful one, who, as a rule, needs no stimulation to do all that he can do safely.

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I am persuaded that few of us begin to realize the extent to which physical damage results from habitually massing together large numbers of pupils. Danger of exposure to contagious diseases is certainly not one of the most serious facts connected with it.

As the Lord was not in the whirlwind, nor in the fire, nor in the earthquake, but in the still, small voice, so many of the great forces in life are silent, steady, and often unrecognized. A crowd of any kind is fatiguing, and in time, will overwork and disorganize nerve tissue.

The teacher also suffers greatly from this unfortunate habit of of social pressure.

Many of our modern forms of disease are but expressions of exhausted nerves—exhausted by the almost constant, but scarcely perceptible, friction to which the individual is subjected by the habit of assembling in crowds, especially when a feeling of responsibility accompanies it.

There is something more than a joke in the reply of the college president who, when asked how it came about that his institution had turned out so many fine men, replied, "I think it must be due to our long vacations, which enabled them to spend so much time quietly at home with their mothers."

A fourth danger lies in the fact that no provision is made for the occasional relief needed—especially by females—on account of periodical and taxing functions, and by rapid growth.

A fifth danger lies in the fact that so little attention can be paid to *individual peculiarities* and needs.

The application of our means of education indiscriminately, *en masse*, naturally suggests to a doctor's mind the ridiculous custom of using patent medicines and popular cure-alls for sickness instead of having a competent physician prescribe according to the indications in each individual case.

Through this attempt to meet educational demands on the basis of the *average ability*, some persons are overworked while others acquire wasteful and loose habits of study and thought. In either case the mind is injured.

Time will not permit me to state, at any length, the sources of danger to *mental* health. It covers a large part of the ground to say that anything that injures or hinders physical health is injurious to the mind. Allow me to add that it is injurious to the mind to cumber it largely with facts and ideas that it cannot digest or even apprehend.

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Many a memory breaks down from overloading. Education and knowledge should be a matter of *growth*, not simply of aggregation or accumulation.

General principles and universal laws should, as early as possible, form the shelves upon which *facts* should be arranged and allowed to rest.

Facts of observation should precede and outnumber facts of dictation or historical statements.

Hence, much of our grammar, geography, history, &c., should wait for greater maturity of mind and a wider experience. This statement naturally suggests to your mind that general error of parents and teachers, of placing children in school while too young, and attempting to educate (or instruct) prematurely.

The chief danger to moral integrity and power is that, in our absorbing devotion to the *intellect*, the moral life shall not be allowed even a chance for natural development, to say nothing of having a chance for training.

There are those who would restrict the school simply to cramming the intellect with facts and theories and to training it in methods of sharp practice. Such persons would make us believe that,

> "On earth there is nothing great but man;
> In man there is nothing great but mind."

Many would go further and say,

> "In mind there is nothing great but intellect;
> In intellect there is nothing great but memory."

They may admit that the *emotions* and the *will* must be recognized as facts; and that so far as they conveniently can be, they ought to be used to assist the intellect, but as to making them prominent and important factors of mind and training them with such care as we exercise toward the intellect, that seems as ridiculous as to the Indian seems the proposition that his squaw is naturally as good and smart and valuable as himself.

For the highest good of the individual and the state it is as important that one be trained to *feel* right in relation to a fact, as that he apprehend that fact, and it is equally important that his volitions be trained to determine right action in regard to facts so far as he is related to them.

The emotions and volitions are not only as important, but they are as susceptible to development and training as is the intellect; and any person with a "cultured" intellect and uncultivated emotions and will is a monstrosity.

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And yet the cry of many is: "Keep the Bible and moral instruction out of the schools."

"No religion there, if you please." "Do your moralizing at home, or nowhere." "Men can't agree as to right and wrong" "Train the intellect at school and let the family and the church take care of the morals." I am pursuaded that any republic that divorces moral instruction and training from its public schools and universities thereby digs its political grave.

Moral character is naturally and necessarily formed along with the physical and mental development; hence it must be established early. The family, the street and the school are its nurseries. The first in many cases is a poor one, the second is always bad, and the only hope for general help rests naturally on the school.

In this country we do not want human monstrosities, but *citizens*, *lawmakers*, *defenders* of truth, justice, liberty and honesty; and so sure as "righteousness exalteth a nation" so surely do we need moral, and if you please *religious* (not sectarian) instruction and training in the school.

Only by *cultivating it* can we have moral health, hence, *the great danger to moral integrity* lies in employing immoral teachers and in ignoring positive and aggressive moral training in our schools.

The essentials of Christianity are the basis of all truly noble manhood and womanhood, and cannot safely be left out of any educational system.

In our country at the present time the low state of moral vitality is alarming. It is astonishingly conspicuous in the want of public conscience concerning gambling methods of conducting business in our commercial centers; and in our political customs and methods. Moral integrity and a conscientious obedience to all laws favorable to the well-being of our citizens, are essential to success in the efforts of this Board to stamp out infectious diseases and to the prevention of crime; unless morality keep pace with our progress in material interests the latter must soon cease.

Our schools must do more to implant and nourish in young minds a love for the right and habits in morality, or not only will moral healthfulness but mental progress and physical health decline instead of improve. Our great need is *less cramming of the intellect*, and a *more systematic and symmetrical development of the physical, mental and moral life.*

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A PLEA FOR FRESH AIR AND EXERCISE.

By Rev. Dr. D. C. Johns, President of Hamline University.

I have somewhere read that man is an air-breathing animal; that in his lungs there are about 600,000,000 apartments which have, or ought to have, uninterrupted communication with the atmosphere. Into these cells he can force about one gallon of air; but he usually contents himself with about one pint per respiration, showing that his capacity is far beyond his ordinary necessities. Our atheistic friends would say, here is a chance; here is a want of what Joseph Cook would call co-ordination between the organ and its function."

But stop a moment. A wise manufacturer always supplies himself with more power than he needs under ordinary circumstances, not only to lessen the strain on machinery, but to provide against emergencies. The physiologist would say this is a wise provision to enable the man to live when part of the organ is destroyed, or rendered inoperative by congestion, tuberculosis or hepatization; but the teacher must insist that it is a merciful provision to protect himself and his pupils from the ignorance and parsimony of architects and school boards. After thorough investigation of the subject, have satisfied myself that the discrepancy between the power of the lungs and their functions is not to provide against wear and tear, nor a partial breakdown of its own tissues, but to anticipate a coming civilization, which, by virtue of improved carpentery, would be able to prevent a circulation of air in buildings, and thus deprive their inmates of an adequate supply of oxygen. It is, in short, a provision designed to protect teachers and innocents from being murdered outright by architects, school boards, boards of trustees and others, who erect buildings at public expense.

One by one the chinks and crannies have been closed, until we might exhaust our rooms with an air pump by strengthening the doors and windows sufficiently to resist the outside pressure. Excluding air is a most excellent method of preserving *dead* tissues; but live ones languish and die under the same treatment. Rebreathing vitiated air is as unhygienic and indecent as re-swallow-

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ing a refractory dinner; but civilization, as represented in the school, the hall, the church, and even private houses, does not so regard it. I do not believe there is a building in this state in which, if filled to its capacity, the air would be fit for respiration in half an hour. I have yet to see the schoolroom which can boast adequate ventilation. In my own, after three consecutive recitations, in spite of lowered windows and open transom, the air becomes so foul that one of the brightest pupils gapes eleven and a-half times in fifty minutes. You may wonder how I get the half; but there is no mystery about it, whatever. The young man understands the proprieties of the ocasion, and tries to gape with his mouth half open. Hence it requires twenty-two efforts to procure the easement of an old-fashioned ten o'clock chimney-corner yawn, which I consider the proper unit of measure. This symptom of disease is excessively contagious; and if the teacher were a novice he would be led to suppose that a prevalent poultry disease had invaded the school, and disband it under the Contagious Diseases Act. But humor aside. This story, barring a little exaggeration, is a true one—founded on facts, as the novelists say, and you may be curious to know how the room in a modern school edifice is ventilated. It is heated by steam, direct radiation, and has a flue with register in the outside wall to carry off foul air, with no opening whatever for the admission fresh.

Through this flue the air *never* passes outward. The buoyancy of the warm air of the room just about balances the column of cold air in the flue; but in *very* cold and especially in very *windy* weather, there is a downward current. As a cold air duct it is not a success, and as a ventilating flue it is an absolute failure. At present it is of no more use than the eyes of a mammoth cave fish; but as nothing is said to be made in vain, we may some day want to put a stove in the room when we shall no doubt admire the wisdom of the architect in providing a chimney for an unforseen emergency. All this exists in a beautiful edifice, planned and built during the last decade, under the supervision of one of the oldest and most popular architects in St. Paul and Minneapolis; and he is not an exceptional case. I sharply arraign architects and steam-fitters with being ignorant or neglectful of the laws of atmospheric movement, and thus causing irremediable blunders in valuable buildings, and untold inconvenience upon their inmates. It is time somebody were looking after this matter, and I know of no man, or association of men, better qualified to discharge that duty than the State Board of Health.

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There is no difficulty in ventilating small buildings, in which all the rooms can easily be put in communication with the fire box in the cellar or with a flue built up with the chimney. In a building of one hundred rooms, many of which are a long distance from the chimney, the case is far different. To put all these in communication with a flue heated by the chimney, would involve great expense; to heat a flue for each room would be still more expensive, and yet these are the only alternatives which our present knowledge of aerostatics gives us. In short, the problem of heating and ventilating large buildings economically, is yet unsolved.

Heating by direct radiation is of all methods the most vicious except, perhaps, that of the charcoal pan and the oil stove. Hot air furnaces must change the air of a room in order to heat it. True, they must be overtaxed, yet for every cubic foot of hot air sent *into* the room, one cubic foot of cold air must be expelled from it. This plan, antedating the discovery of gravitation, of course takes no advantage of it. It compels the furnace to perform the duty of a force pump in addition to its own, and lift the air through a cold flue, forty or fifty feet in height, or drive it out through the chinks and crevices of the room. But, however great the disadvantages of hot air furnaces, they secure a change of air, and that is more than can be said of direct radiation. The air is often burnt and dry, sometimes smoky from the warping of overtaxed plates; but so long as the room is *warmed*, the air must come and go.

A steam coil, however, will keep a room warm for a year, without the change of a cubic inch of its atmosphere. Heat will dart off from a coil, when the air is thick enough with carbonic acid and animal matter to be cut with a spatula, just as well as when it is perfectly pure. Steam-heating by direct radiation is economical; and where human life is of no consequence, it may be of some use. To put into execution the doctrine of Malthus, or to illustrate the survival of the fittest, no more satisfactory arrangements could be adopted; but for heating and ventilating rooms hygienically, it is a failure. The defect is radical and inevitable, and the sooner steam-fitters abandon it the better. Indirect radiation supplies fresh air, but provides no escape for foul. The atmosphere of a room at a comfortable temperature will not lift a column of cold air in a ventilating flue, and there are but two ways out of the difficulty. Heat enough must be generated to drive the air out of the flue, or the flue must be heated. Both expedients involve an expense which few are willing to incur;

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and this brings me to the second part of my subject, viz., what can the State Board of Health do to secure ventilation for our schools. I have already intimated that this is the proper body to investigate this subject, and give us, if possible, an improved method of heating and ventilating school buildings. I admire the heroism with which it fights diphtheria, the energy with which it stamps out small-pox; but the fatality arising from these diseases is trifling compared with that arising from imperfect respiration. A climate which keeps invalids in-doors five months in twelve gives them but little chance for life, if, in addition to confinement, they are compelled to live on a stinted supply of oxygen. All persons understand the sensation of cold, and provide against it; but not all understand the symptoms or consequences of foul air. Many who will not tolerate the least discomfort from cold, will sit in a room until they are on the verge of asphyxiation, without knowing what is the matter with them. Whatever may be the causes of diphtheria, typhoid fever and other zymotic diseases, their peculiar virulence in the winter season is not without significance. Food and water are purer in winter than in summer. Malaria is destroyed by frost. Whence then the increased numbers and malignancy of these diseases, unless from respiratory and dermal excretions, with which the air of our rooms is surchaged during this season? In tropical climates, ventilation is not a practical question; there malaria is almost the sole enemy of human life; but in a hyperborean climate like ours, it is the all important question of hygiene, and I think the State Board of Health ought to give it their immediate attention. If necessary, ask the legislature to appropriate thousands of dollars to make experiments, to gather information, and give it to the public as soon as possible. Plans for heating and ventilating all classes of buildings from the dug-out to the Nicollet house, and from the log school-house to the University, should be published in pamphlet form, and scattered through the state. I suggest that the first copies be sent to architects, steam-fitters, school boards, trustees of churches, &c., and after that to every household in the state. The pamphlet might wind up eloquently with the quotation of "A Plea for Fresh Air," respectfully addressed by a smothering parson to his sexton, and thus given a wider sphere of usefulness than originally contemplated by its author.

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THE RELATIONS OF RELIGIOUS TO PHYSICAL CULTURE.

By Rev. R. F. McLaren, St. Paul.

1st. All true religious culture results in improved physical conditions, and increased physical endurance. There are some developments which suggest the contrary. Nervousness, hysterics and insanity have often been attributed to religious exercises. But, we must remember that there is a vast difference between being religious and being excited about religion. Excitements about religion often injure the health, but religion has a general effect in improving it by strengthening the higher vital powers.

It is a mistake to suppose that the higher faculties are developed at the expense of the lower or physical.

Man has more endurance than the beast.

Civilized man has more endurance than the savage. The educated man, other things being equal, has more than the ignorant, and the Christian than the heathen.

We refer not to all individual cases, but to general effects upon communities. True religion tells men to abandon many courses of conduct terribly wasteful of vital force and health.

It awakens high hope, gives man more to live for, relieves his heart of many a heavy burden, and in countless ways makes the current of his life flow with a strong healthful pulse.

We dwell in a Christian community, where the above general results are manifest. But even here we find a vast amount of pestilence, wasting disease, bereavement and consequent sorrow. To correct this terrible condition of things, is the object of all sanitary reform. As a Christian minister I express my positive conviction that this reform will be greatly aided by giving to the multitude a correct understanding of a certain theological doctrine. I refer to the doctrine relating to the Providence of God. A few generations ago, all pestilence was regarded as a direct and arbitrary visitation of God, to be averted by prayer and fasting. This

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same opinion has a large hold upon the multitude to-day. We need to preach that it is the will of God's Providence that good health shall prevail as the result of regarding certain conditions divinely established. That in this, God is no respecter of persons, but sends blessings to the evil and to the good, to the just and to the unjust in proportion to their obedience.

According to this doctrine a truly pious man, who starves himself on indigestible food will suffer many agonies, while his infidel neighbor whose kitchen is well ordered, and who eats cheerfully of wholesome food will escape all peptic trouble.

The devout Christian who tolerates a foul cesspool, atrocious plumbing and ill-ventilated bedrooms, may find his children dying of malaria, while the family of his heathen neighbor who has a well regulated house will enjoy excellent health.

A Christian city of to-day, which neglects its drainage and water supply will be visited by diseases which never gained a foothold in an ancient pagan city well provided with sewers and aqueducts.

The devil one day took Christ up to the pinnacle of the temple, and advised Him to cast Himself down. Christ answered him, giving the Divine sanitary doctrine, when He said "Thou shalt not tempt the Lord thy God." Man is not to presume upon the love of God to save him from his carelessness, or wilful ignorance. Doubtless the quickest way down from the temple was by the way of stepping off into the air. But this was a deadly way, and hence unlawful. Doubless the quickest way to build a city, or a house and, for a while, the cheapest is to leave out all care of sanitary conditions.

But God has pronounced against all such haste and economy and will scourge us until we act according to law.

The poet Longfellow sings that:

"In the early days of art,
Builders wrought with patient care,
Each unseen and hidden part;
For the Gods see everywhere."

The religious culture of to-day should teach the same lesson of faithfulness. It should teach us that it is pleasant to God that the rear of a house shoul be as clean as the front door yard; that the cellar should be cleaned as carefully as the parlor; that sinks should be well trapped, and that plumbing hidden beneath the floor should be done with as good fidelity as if it were exposed to every eye.

Professional men, and especially Christian ministers should be careful to obey the Divine law demanding bodily exercise. Christ

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and his apostles were great walkers. They lived much in the open air and sunshine; and the minister who regards their example will not make his calling a sedentary one. Christ said to His disciples, "*Go ye !*" and the law of bodily activity as well as spiritual has ever since remained unaltered.

A short time ago, I received a circular from a medical firm, strongly advising the use of some homeopathic powder as a specific against the effects of bodily inactivity. It was strongly commended to ministers. $1 per box; six boxes for $5 ! I have not sent for it. I know God's law, and expect to obey it.

True religion proves that in the Golden Age there will be a reign of spiritual purity, but also of bodily perfection. Christ said, " Thy signs be forgiven thee;" and He also said to the sick man, " Arise; take up thy bed and walk. He cleansed the leper and calmed the palsied, and did and said many things prophetic of the day when the bodies of men would be alike healthy and happy.

Our religion give us the most exalted views possible of the human body. The greatest care was taken of the body of Christ. It saw no corruption, and it ascended to heaven. And the future of our physical nature is associated with the wonderful mystery of the resurrection.

Physical culture has a salutary effect in some directions upon our religious life and work. It cannot be denied that a man's thought is affected by his bodily condition. Many morbid doctrinal views have been inspired by impaired digestion or fevered brain.

A very eminent writer tells that, while living at a boarding-house, he partook one day of a section of mince pie which resulted in an indigestion, under the inspiration of which he wrote an essay on a theological subject, in which he took exceedingly gloomy positions regarding life and immortality. After he recovered, he put the essay in a large envelope, labeled it, " pie crust," and laid it away in a pigeon-hole to be looked at as a curiosity.

A stupid, blundering janitor has often destroyed all good effect of the gospel preached by the minister, by neglecting to ventilate the church, and compelling the people to breathe the warmed over air of the last Sabbath. In my pastoral visitation, especially among the poor, I have constant use for a quite thorough college course in physiology and hygiene, finding it profitable first to minister to physical necessities, and then to the spiritual.

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The conclusion of the whole matter is that true theology tends to improve bodily health, and bodily health reacts upon our theology, and makes it more practical, kindly, and sympathetic.

God has ordained certain laws of health of such a nature that the heathen will be blessed in so far as they obey them, and Christians will be cursed, in so far as they violate them. And in so far as Christians obey them they shall be strengthened and inspired for greater endeavors to convert and save the world.

HARMONY BETWEEN PIETY AND SANITARY LAWS.

By Rev. C. T. Van Anda, of Minneapolis.

To know what a man loves is to know what he is.

If he loves supremely that which gratifies his appetite, he is a sensualist. If money is *the* object of his affection, he is narrow, cold, selfish and, if opportunity allows, a miser. If he loves his fellow men, he is kind, gentle, magnaminous. If he truly loves the Supreme Being, he tends to become like Him; in other words to be the very best man he can be.

Such devotion to God completely harmonizes with sanitary laws. Other things being equal, the most pious community is composed of people having the best health and the longest life.

This proposition is supported by the following among other reasons:

1. Piety promotes the discovery of sanitary laws.

I am not asserting that a man is an expert in any line of human thought or action *because* he is pious, nor that only the pious can be eminent in scientific investigation, but simply this: Piety is an intellectual stimulant. "The entrance of Thy word giveth light: it giveth understanding to the simple."

The sun emits light and heat, and his rays carry vitality to a frozen earth. So God is light and love, and hence, life. Association with a clear vigoros mind not only secures knowledge, but also a love for it and the capacity of acquiring it. The soul of Homer, Plato, Shakespeare, Handel, coming into contact with

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that of an unlettered child through the medium of language, is like fuel to a latent spark, kindling it into a blaze. So the soul of God, vitalizes the human soul when brought into association with it.

And further, the possessions of a friend are better known to us than those of a stranger, because their value is increased for their owner's sake, and our pleasure from acquaintance with them is only second to that of acquaintance with the owner himself.

A geneological tree is without interest to us, unless it be a representation of our immediate ancestors: then imagination and fancy load it with foliage and flower, and fruit pleasant to the eye and sweet to the taste. A human being is the most valuable possession that God has on earth, hence the study of the laws of his being is to a pious soul the most fascinating of all the Creator's works. "The proper study of mankind is man."

2. Piety renders sacred all the laws of God. One law is not more sacred than another, because its revelation is peculiar. God as certainly made the relations between men and the conditions of their health and long life as He gave the Ten Commandments.

The dutiful child is obedient because the parent's wish is in harmony with his own. So God's law is the expression of the highest purpose of a pious soul, and is sacred because its author is the supreme object of affection to that soul.

3. Piety enhances our estimate of the value of long life.

The measure of our appreciation of the value of an object, is the measure of the effort we make to secure it.

Piety implies the conviction of God's absolute ownership of the bodies and souls of men. The investment is God's. The care of it is ours. Hence loss of strength, time, happiness, is so much robbery of God; so much added to the poverty and suffering of the race, and so much subtracted from the sum total of its health and happiness.

Avoidable diseases are therefore crimes, the grade of which is determined by our opportunities of *knowing* better than we *do*. Disease resulting from poisoned air, when the pure article can be obtained, or from gluttony or want of exercise, when it can be taken ought to make a man as much ashamed of himself as if he had lied against his neighbor.

In proportion as another is the object of our love, are his rights respected. The pious respect God's rights; but He has a right to the very best use of my powers.

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A diseased body or mind cannot produce its best, no more than the engine, whose fires burn low can propel machinery with its full force.

Facts show that where piety the most nearly approches the type presented in the Sermon on the Mount, there Sanitary laws are the most patiently studied. The most thoroughly understood, the most carefully observent, and as a consequence, there we find the nearest approach to the maximum of health and longevity.

Comparing England and Russia, for example, we find that the average of mortality in the former is 2¼ per cent., and in the lat ter 3½ per cent.

And statistics show that in Germany, Great Britain, and the United States, the average degree of health, as well as length of life, is constantly increasing, and in these countries christianity is steadily and vigorously spreading among the people.

It follows, that the growth of piety induces a better observance of Sanitary laws, and hence better health and longer life.

PASTORAL DUTIES IN RELATION TO HYGIENE.

By Rev. James McGolrick, Minneapolis.

To alleviate the miseries of the poor, to comfort those stricken down by disease, to aid them in the weary days of sickness, is a noble duty; but to prevent so far as we can this suffering and misery, to root out disease, to prolong life and give to every man the precious boon of health, "*mens sana in corpore sano*," how much nobler, how much a holier and a higher duty, how much more worthy of the best efforts of every lover of his kind.

This, gentlemen, is your appointed labor — a work in which all men ought to be interested, and yet the advance must be by slow degrees, for, even here, you have to contend with ignorance, prejudice and indifference.

This ninteenth century of ours, which has made such giant strides in advancing art and sciences and in utilizing wonderful discoveries, has much yet to learn; for, just as of old, the selfishness of city corporations and the indifference of our legislators bar the way to progress. Here is a quotation from an old book which

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might well suit our time and circumstances, and yet the incident took place four centuries ago, while America was yet an undiscovered land: —

"In the fourth year of the reign of Henry VII. of England, a petition was presented by the inhabitants of St. Faith's and St. Gregory's, in London, near adjoining the cathedral church at St. Paul, setting forth that "the parishes aforesaid, were greatly annoyed and *distempered* by corrupt airs engendered in the said parishes, *by occasion of blood and other fouler things*, by reason of the slaughter of beasts . . . had and done in the butchery of St. Nicholas . . . and whereas sundry complaints have been made to the mayor and aldermen during sixteen years, *and no remedy found;* they pray the King, out of his abundant grace . . . to succor his poor subjects in this behalf, considering that in few noble towns or cities, or *none* within Christendom . . . the common slaughter of beasts should . . . be within the walls of the same."

Such is the substance of the petition in the preamble of the act.

The legislative result accords: "No butcher or his servant is to slay any beast within the walls of London, or any walled town in England, under a penalty of twelve pence for an ox or cow and eight pence for every other beast."

The above is an example of corporate selfishness and corporate desire to perpetuate a monopoly of filth, which in some measure still exists. Sanitary reform is necessarily of slow growth and must be undertaken nearly altogether by the natural advisers of the people in such matters, the practicing physicians.

Medical boards can, however, receive much assistance from the clergy, more particularly amongst the poor, who are inclined to place entire confidence in the advice of their spiritual guides.

How often the pastor is called to visit some poor patient stricken down with disease, where there is much needless suffering from dirt, disorder and carelessness. He finds the sick one in some darkened room, with windows closely nailed, and it maybe an old shawl tacked up to shut out both air and light; the overheated room, the burned air, the heavy odor and the sickening exhalations are all working out their sad effects upon the fevered patient. Upon the table near the bed is a jumble of medicine bottles, powders, pills, impure drinking water, old tin vessels and dirty goblets, all mixed up in confusion. The walls are adorned with old dresses, belonging to the family, the poor people knowing nothing of the traps to *take* and *hold* the seeds of contagion which

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these same articles of clothing prove to be. Such are too often the surroundings of the afflicted poor.

The doctor on his daily rounds, examines his patient, orders suitable medicine, cheers up the sick one by a kindly word, and then goes on his hurried way.

With few exceptions, all the doctors we ever met, take no note of the house and the surroundings of the sick, or if they do, they consider all remarks on these circumstances as entirely outside of their legitimate business. It must also be frankly stated that clergymen follow this bad example with scrupulous care, either through a foolish fear that they may encroach on the physician's territory, or give offense to the people immediately concerned.

Now, here commences a grand work for the pastor. With the kindly aid of some neighbor—and it must be said that the poor are always willing to assist each other, or with the assistance of some member of the family—the room is quietly cleared of the clothing that festoons the walls and the necessary light and air are given admittance. A strip of board two or three inches high placed beneath the entire length of the lower sash will always secure the free admittance of air without danger of draught, and the light can always be so controlled, by means of the same old shawl, as not to weary the eyes of the patient. The chaos on the table is reduced to order, an open tin vessel of water is placed upon the stove, fresh water is obtained for immediate use; and all this is done so quietly and without that semblance of dictation so hateful to most people, that the change is almost magical. Having thus earned a certain right on the premises, now would be the time for the pastor to consult the physician and ask him to investigate the causes of the disease, to take a glance at the surroundings and find out whether impure water, defective sewerage, or infected out-houses and closets are not the fruitful sources of the contagious disease.

If disinfectants are to be used both pastor and physician should gladly co-operate with each other. How little poor people know of the value of disinfectants; and yet for our great purpose of preserving health by destroying the very germs of disease, how necessary to make this knowledge "familiar in their mouths as household words."

In every large city there should be a free dispensary from which the best disenfectants could be obtained, with simple directions as to their use. We know with absolute certainty that filthy cesspools, bad ventilation and defective drainage are constant sources

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of contagious disease. What shameful indifference or criminal negligence, then, must it not be to allow a whole brood of diseases to attack the community when the judicious employment of disinfectants in proper time and place can so easily remedy so great an evil.

It is in the schools, and amongst the various societies that a pastor, particularly a Catholic pastor, can exercise the most direct influence in favor of hygienic laws. He must, in the performance of his duty, visit the schools frequently, and he cannot but notice there, the extraordinary carelessness of many parents in refusing to see the evident signs of incipient disease in their children.

Here is a little one, with stooped head and rounded shoulders, already marked out for consumption; there is another whose hearing is manifestly defective, and who has never been brought to the notice of a physician. There stands a child who holds the book so near her eyes that it almost touches her eyelashes; and what is all this but a mute appeal to some one to remedy the defect while there is yet time.

How much good could be done if the health officer, or some kind-hearted physician would visit our schools occasionally, and give the pastor and the teachers a few wise hints on the means to be adopted in such varied circumstances.

In my parish schools the advance classes have for several years used Huxley's excellent hand-book of Hygiene, and with the very best effects. The children are called on frequently to go through approved bodily exercises in their rooms in time to music, and in the open air, but there is much yet needed in that direction. A cheap and well-arranged manual of hygiene, written in plain English, divested of technical terms as far as possible, would be one of the most useful books both at home and in the school-room. It is to be hoped that the day is not far distant when every school in our State can be abundantly supplied with such useful manuals. In conclusion, let me say, that all wise effort on the part of the Board of Health will meet with cordial co-operation on the part of the Catholic clergy of the diocese of St Paul.

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RECREATION FOR BUSY MEN.

By Rev. D. R. Breed, of St. Paul.

Busy men are the most in need of recreation, and the least able to take it. But they must have relief, in some shape, or break down; and because they believe that they cannot, numbers of the best and brightest who might else have been active for years are annually gathered to the majority. This truth is so often stated, that I should apologize for its utterance, except that it is not at all realized.

In the course of my preparation for this paper, I made out a list of prominent men in business and professional life of my own city (Saint Paul), all of whom went down to their graves before they were sixty years of age, within the twelve years of my residence there.

I did not include in the list those whose death was clearly attributable to unavoidable causes; but only those who died chiefly because of overwork and under-rest. The names are about a score, but they present only the examples of hundreds in whose death, often at a much earlier age, families are made desolate and society is impoverished.

But if busy men are to have any recreation, it is necessary first of all to overthrow a great social heresy. To the average American mind rest is synonymous with "loafing;" and the desire for recreation is attributed to a spirit of laziness. "Better wear out than rust out," we say; a proverb which has killed some of the best of men. "This is my busy day," says the little sign on the merchant's desk, which, inasmuch as it is never removed, indicates that every day is a busy day.

Indeed he would be ashamed of himself if it were not so. The genius of hurry, of excitement, of boiling impetuosity, has been so exalted in this republic, that it is accounted a disgrace for a man to have any leisure time. If he is not busy, he tries to be, and pretends to be; and if his friends discover that he has less to do than he can do, or that he accomplishes all that he has to do, so as to have

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some time to spare, they regard him suspiciously, and he is made to feel like a sneak. Many a time when I have been exhausted with my own work, I have tried to slip out of the city without being observed, lest my recreation should be miscontrued. I have a carpenter shop in my basement, where I occasionally amuse myself spoiling good lumber. I am not in it half so much as I should like to be. But on one occasion, when I had not spent half a day in the basement for ten months, a kind friend took me to task because I *spent so much time in my shop.*

You will pardon these personal references. They seem to be necessary to establish my point. In America, and especially in the West, recreation is regarded with suspicion.

Busy men take no rest, and are proud of it. They oblige their employes to do, as they themselves do, or vacate their positions. Rest is regarded as unnecessary; healthful sports are discouraged; and "*loafing*" is a crime. This is the heresy of which I speak, and which must be overthrown — a heresy which holds its place in the social and commercial orthodoxy. So that our first duty is to pursuade some men to admit that they have more time than they pretend to have. "Time to spare, but none to lose," is a motto which should receive more general adoption.

Time is not missued which is spent in the relief or exercise necessary to recuperate the exhausted powers. The greatest waste of which Americans are guilty is not a waste of time, but of brain and body; and for my own part, I am unwilling to commit suicide only to convince the world that I am not a loafer.

But we proceed to the practical question — *What recreation is proposed for busy men?*

The very hypothesis contained in the question indicates that they cannot take *much* recreation. Their time must be economized. They must secure the largest amount with the least expenditure.

The question, therefore, is not an easy one to answer. In no possible way can a five minutes rest be made to equal one of five hours. The greatest doctor in the land, much less a layman in medicine, cannot inform our busy men how to obtain the full value of a day's recreation in a single hour. In this line, as in all others we must pay for what we get; and our busy men must be taught to acknowledge it.

You can't buy a silver cornet at the price of a tin horn. If men wish to live long and "enjoy the work of their hands," it must be at some expense — expense of time, of money and of fame. It is

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more money and more fame together with more bilious complaints, more sick-headaches, more neuralgia, more nervous exhaustion and and a predisposition to apoplexy and paralysis; or less wealth and reputation with a clear head, a painless body and a fair chance for a happy old age. This is the plain truth, which should not be disguised.

The book of Proverbs is one of the best of works on Hygiene. Permit me to quote a few sentences: "Better is a little, with the fear of the Lord, than great treasure and trouble therewith."

"Better is a dry morsel and quietness therewith, than a house full of (sacrifices) good cheer with strife."

But, though this be the fundamental truth, it is also true that a whole day may be passed in such profitless recreation that a single hour well spent would be vastly more beneficial. *How then shall we make the most of our leisure?* In order to answer this question several well known principles must be borne in mind.

1. *Work is so natural a function to busy men that* it cannot be entirely abandoned or unduly diminished with advantage.

The very rest which some active men oblige themselves to take when they find themselves breaking down under their burdens, is sometimes a positive injury. It is such a violent reaction against their settled habits, that it racks the system instead of resting it.

2d. Yet there is danger in another direction; for while the habit is one of work, the need is still for rest; and hence *violent exercise may be of no profit to a tired brain.*

If one should impulsively race with a locomotive, just because he "*needed exercise*," he might permanently injure the organs which are altogether unused to violent exertion. But relief is often sought in some such way. The man who has not been out of an office for a year goes off on a hard tramp, a hunt, a fishing trip, or what not; and instead of returning to his office refreshed, returns the more exhausted.

3. *Recreation, like labor, must be systematic.* An annual vacation is an annual folly, if it be regarded merely as a make-weight for a year of unremitting work. The benefit which is derived from the few weeks of summer's rest is often dissipated in as many weeks of the exhausting "fall trade." There is no way to secure its permanent influence, save in the avoidance of the habits which rendered it a necessity.

Recreation should be taken as regularly as our meals, and almost as frequently. Such an "ounce of prevention" would be

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a positive saving to many a busy man, if he could be taught to believe it, because,

4. *It requires more time and greater care to recover the tone and tension which has been lost through persistent over-strain than to preserve the normal health.*

5. *A broad distinction should be made between relaxation and recreation.* There are many social pleasures in which busy men are tempted to engage which minister nothing but fatigue. A fashionable party, with its rich viands and late hours, may be most enjoyable, but it affords no new strength to the jaded system. There are many social exercises which, while they offer the advantages of change of scene and diversion of thought, are still a burden to the exhausted powers. It is not necessary to specify them.

6. The old familiar principle should also be enunciated—*the greatest recreation is often found in a change of occupation.* The body is rested by exercising the brain; the brain is rested in exercising the body.

As a rule, therefore, our recreation should be sought in exercising those functions which receive little or no exercise in our daily occupation.

We pass now to some practical suggestions, and mention several forms of recreation which are available to busy men.

1. *Sleep.* It is supreme; the first, the best, the most glorious recreation! We cry again, with Sancho Panza, "Blest be the man who invented it!"

But the heresy of which we have spoken is in full force to abridge this blessed boon.

There is an old rhyme, which I cannot accurately quote, but which allots to various classes, their various portions of the hours of sleep, about as follows:

"Six for a soldier;
Sev n as a rule;
Eight for a working-man;
Nine for a fool."

Judged by this ancient doggerel, I confess myself something of a fool.

But I am convinced that in no other respect is the average American so unjust to himself, as in this. He dreads the name of sluggard as he dreads the plague.

He acts as though every hour he wrests from his natural allowance of sleep is clear gain, whereas it is dead loss. He accounts it

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a credit to him to "burn the midnight oil." So it comes about that a very common and increasing complaint among Americans is sleeplessness. It is a complaint for which the sufferer has only himself to blame.

He would not sleep when he could; and now he cannot sleep when he would.

The evils which succeed this ailment are many and dire.

Oh! that I might pursuade my busy fellow-citizens to avoid it. *Sleep!* it is the sovereign solace, the supreme recreation.

2. *Food.* Pardon these simple suggestions; but if "recreation" be what I esteem it to be a re-creation of our powers, then a meal of good food is a grand recreation.

Americans are in haste in their eating as in everything. Their meals are irregular and often insufficient. They take a "bite," when they need a full repast; and go on "working on their nerve," when it would be much more profitable to work on a beefsteak. The man who does not take time to eat, *deserves* to break down, and will certainly do so. We should eat regularly, eat slowly, and rest awhile after every meal, in order to have the right to expect the health which we desire.

But there are other forms of recreation, which perhaps were specially in mind in assigning this subject.

3. Every brain worker should have some systematic form of exercise in which he shall regularly engage for a portion of each day.

There are several good books in which this subject is treated and I need not enlarge upon it.

But I do not believe there is any better form of exercise than the following, which I think it worth while to describe. The apparatus is very simple, consisting only of three pieces, inexpensive and effective.

In its use almost every muscle of the body is called into play; and the brief space of fifteen minutes a day devoted to the noble art, which may soon be mastered, will work wonders for the health, strength and happiness of a busy man.

The first piece of the apparatus can be obtained of any dealer in like instruments. It consists of a thin piece of steel, about three inches broad, with a serrated edge, which is subjected to considerable tension by means of two pieces of wood, one fastened to each end, strained across a middle piece by a connecting wire and thumb-screw. The scientific name of this instrument is "ligni serra." The second piece consists of two wooden frames, each in the shape

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of a letter "X," set parallel to each other, about 18 inches apart, and joined firmly together with a cross-piece. The third portion of the apparatus can be bought at any wood-yard at seven dollars a cord. Hard maple or ironwood is the best for this use. This is the best "health lift" I know of. Fifteen minutes a day devoted to the "saw-buck" will be more than repaid to the busy man in better digestion, a clearer head and increased capacity for work.

4. In addition to the few minutes of systematic daily exercise, the man who desires to do his best should have stated seasons of recreation extending over several hours. He should never allow his work to infringe upon his Sabbaths. He should leave his work outside the threshold of his home; or if obliged to do some work at home, he should do it and *be done* with it, so that the time given to his family should be unalloyed with distracting thoughts of his business or profession. Let there be as many evenings as possible for his wife and children. Take the baby in his arms and let him pull his whiskers till both shall squeal; romp with the other children; read something aloud that his wife is interested in, whether he enjoys it himself or not. There are some of the busiest of men of my acquaintance whose health and spirits have been long preserved, as I believe, because they have made this an invariable rule: *The home for rest and comfort—no business cares shall enter here.*

It would be well, in this connection also, to provide for a whole afternoon's recreation at stated times—say once a fortnight. The Jews, by divine appointment, had their festival seasons, in which labor was absolutely prohibited. They observed not only one *day* in seven, but substantially one *week* in seven, and actually one whole year in seven. Their feasts, like the Passover, Pentecost, and Tabernacles, broke the routine of their labors, while the Sabbatical year absolutely suspended all but necessary labor for a whole twelvemonth. It would be a blessed thing for Americans if they could adopt the Jewish plan. Yet our busy men grumble at the multiplication of holidays, and some even favor the destruction of the sacred Sabbath rest.

5th. Every busy man should have some special pursuit, entirely foreign to his ordinary work—some "hobby" I may say, which is followed chiefly for diversion. If it be in itself useful so much the better; but it makes little difference what its essential character may be, so long as it is not physically or morally injurious. It may be a "craze" for nonsensical collections, or result in some ridiculous creation, like a piece of poetry which shall interest only the author; or an invention which shall never emerge from the

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Patent Office—*no matter whatsoever*, so long as there is relief, and recuperation. Let our busy men adopt some such hobby and spend what time they may be able to command upon it. It will furnish a diversion always at hand—the easel, the bench, the microscope or telescope, the miniature laboratory or whatever it may be—is always there to invite the weary worker and to refresh his mind. Let him choose, if he may, some branch of science, or some department of art. He will grow into the love of it; and may through it be of a service to the world. A blacksmith became one of the greatest of naturalists, a cobbler a painter, and the distinguished etcher now in our own country, charming our dull eyes with his beautiful creations, began to draw on copper as a mere pastime, while he was squandering his time over musty volumes, as an English doctor!

May the day be hastened when every boy shall be taught some proficiency in a trade which he *does* NOT *intend to follow.*

If he become successful in his chosen profession, it may serve him for a pleasant recreation; and if he *fails* upon the line in which he begun his life, he may still have opportunity to retrieve his fortunes in an another embarkation.

6. I cannot forbear to say in closing, that in the exercises of religion is found such blessed recreation as all busy men should seek to enjoy. "They that wait upon the Lord shall renew their strength" (Is. 40:31) is a divine promise which has been often fulfilled. The real refreshment and genuine support which is imparted to the soul in conscious fellowship with God, and which follows those acts of prayer and praise wherein God is approached, have received such testimony to their efficacy that I commend them above all to my busy fellow-countrymen. May "the joy of the Lord be their strength."

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THE MORAL AND SANITARY INFLUENCE OF CHEERFULNESS.

By Rev. J. H. Tuttle, Minneapolis.

Among Solomon's sayings none was wiser, none truer, than this: "A merry heart doeth good like a medicine, but a broken spirit drieth the bones."

These might have been the words of a physician, and they probably were; for he who wrote "three thousand proverbs" a "thousand and five songs;" who spake of trees from the cedar that is in Lebanon even to the hyssop that springeth out of the wall," who "spake also of beasts, and fowl, and creeping things, and of fishes; and to whom the kings of the earth came to learn wisdom could hardly have been ignorant of the laws and needs of the human body. Certain things he said about the human system have led to the suggestion, and on high authority, that he anticipated, by twenty-five hundred years or more, the celebrated discovery ascribed to Dr. Harvey, circulation of the blood. Whether this honor belongs to him or not, his advice in all sanitary matters was unquestionably supported by great learning and wide experience. We can, I think, safely allow to him the title of doctor, a title that should honor any man, ancient or modern.

To what school of medicine Solomon belonged, I will not undertake to say. He was not, we feel sure, a quack, whatever that may mean. He believed in medicine evidently, since he compared cheerfulness to it, confessing that "it doeth good." Whether he gave medicine in large quantities or small, according to the allopathy or the homœopathy plans, I am not informed. I should judge, however, that cheerfulness might be safely taken in large doses, the more the better, I should say. Such a pill could be easily swallowed, for it surely is sugar-coated, sugar all the way through, perhaps. Nevertheless its curative power is wonderful. Speaking for myself, I like such medicine better than I do Epsom salts, or calomel, or jalopa, better than I do any of the things, even the sugar pills which my good doctor mixes in a glass and deals

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out with a spoon. I do not say that the other things mixed in a glass and dealt out with a spoon are not beneficial and necessary; only that I like the taste of cheerfulness better; that I deem it as good and as necessary as the other things. In these days we rather incline toward medicines that can be taken without the sacrifice of a wry face and a resisting stomach. If, then, we must accept the mixture in the glass, whatever it be; if we must swallow the pill, or the powder, whatever it be, large or small, bitter or sweet, allopathic or homœopathic, it seems to me essential to mix with it as much cheerfulness as possible. Cheerfulness "doeth good" like a medicine; if anything more is needed, let this be about nine-tenths of the dose.

That cheerfulness is an important sanitary agent can be shown by quotations from many celebrated thinkers and authors.

Addison says, "Cheerfulness is the best promoter of health;" that "It is as friendly to the mind as to the body;" that "It lightens sickness, poverty, and affliction." Shakespeare says, "A light heart lives long." Emerson says, "Whenever you are sincerely pleased you are nourished." Mrs. Child says, "I always told you that not having enough sunshine is what ails the world." Carlyle says, "Wondrous is the strength of cheerfulness."

Did you ever know a long-lived person who was not also a cheerful person? Thomas Parr lived one hundred and fifty years. He was married, first, when he was a young man, of eighty, and a second time when he was one hundred and twenty! I wish we had a record of the number of times he laughed. He must have been quite a jolly character. It seems unfortunate, from a sanitary point of view, that the account is so bare of particulars concerning the life of Methuselah, which was extended to nearly one thousand years. He could not have carried a "broken spirit," surely, for his bones would have dried up long before that.

Now whether a broken, sad, weary spirit really, literally dries the bones, withers them, shrinks them, I am not enough of a physiologist or anatomist to know; but I do know that it dries, shrinks, withers the flesh; I do know that it undermines and destroys one's health. And if it does all this, it must practically, if not actually, extract the moisture and life from the bones.

The connection between the mind and the body is as intimate as it is mysterious. Break one, and we break the other. Hurt one, and we hurt the other. It is a common thing among us for instance to experience a loss of appetite when we are under any great mental excitement, and a return of appetite when the mind

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is restored to its normal condition. The sudden announcement of bad news, the reading of a distressing telegram, may almost paralyze the blood, or give it a quicker motion, drive it to the face, or force it back bringing instant fright and confusion into all the parts and functions of the body. The invisible arrow of grief shot into the brain does not stop there, but flies through artery, and vein, and nerve, and bone, scattering pain along its way. And how does all this happen? What relation is there, can there be, between thought and flesh? Between a piece of paper, or something written on a piece of paper, and the interior of the brain? and then between the mind and the nerves of the stomach? Here is a problem we cannot solve. And yet it is true that a "Merry heart doeth good like a medicine, but a broken spirit drieth up the bones."

If the whole truth were known it could be easily demonstrated that more people have sickened and died in this world from broken hearts than from any other cause. How was it in our last war? Did not homesickness kill more than fevers and wounds? Was there any medicine in the hospital as efficacious as the coming to the bedside of some dear friend—a wife, mother, sister, or lover? What cup there healed like a friendly hand, and a loving word? We all remember how many persons died of fear in the cholera times; how many in the excitement of any epidemic were hurried to their graves by the chasing ghosts of fear and despair.

As cheerfulness is a great healing power, it is, in my opinion, the duty of ministers to preach cheerfulness, and the duty of doctors to prescribe it. It will improve our morals and our health. A disturbed pulse indicates the presence somewhere of a disturbing cause, but this cause may be near, and it may be far away; may be traced no further than the blood, and it may be traced to the conscience or to some error, some trouble lodged in the aching soul. And if the cause is an ill thought or a broken spirit, what powder, what mixture in the glass can remove it?

"All healthy things," says Emerson are sweet-tempered." Unhealthiness then is an excuse for sour tempers. And are not sour tempers, low spirits, broken hopes, the sources of disease. Some unhappy people who think they need medicine need friendship, sympathy, religion; and some who think they need religion need medicine more. I am glad to know that moral reform, is in many cases, coming to signify physical reform, and *vice versa*. Godliness leads to cleanliness, and cleanliness leads to godliness.

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I do not say that everything can be cured by cheerfulness. I do not say that all diseases can be prevented by it; that all epidemics can be broken up by it. I do not say that there is no fatal poison in our sewers and cesspools; no death lurking under our sidewalks, in our cellars and back yards; that the atmosphere is not now and then laden with dangerous miasms too formidable for all the sunshine we can pour upon them for all the merriment we can throw at them; but I do say that a body or house or street filled with good cheer, with bright hopes, with happy people, will be among the last to succumb to disease; among the first to expel it if it has entered there.

I believe that all sanitary building should be erected and arranged in reference to admitting the largest possible amount of sunshine, to securing the largest possible amount of pleasure. They should be situated in the loveliest spots to be found; they should be ornamented inside and outside, hung with beautiful pictures, supplied with cheerful music, with social enjoyments, with any kind of innocent amusement. I believe one of the qualifications of a physician should be the power of imparting cheerfulness to his patients. He should carry a hopeful face. He should have a manner that creates confidence. He should be like the morning sun in the sick room. There should be as much healing property in him as in his prescriptions.

I have always noticed this, that I am never half as sick, that my pain is never so great, and my condition never apparently so dark and forlorn, just after my physician comes in, as before. I begin to improve before he gives me anything, anything but himself. His presence gives confidence, confidence brings cheerfulness, and cheerfulness drives away my bad feelings.

If, then, happiness is our natural normal condition, and promotes health, happiness is a duty, of course. We should cultivate the habit of cheerfulness. We should seek those places, means and conditions which produce it.

Let us congratulate ourselves to-day, therefore, that physicians of all schools are beginning to advise, while the people are beginning to demand, less medicine and more sunshine; and that this sunshine is not, all of it, expected to come from the sun itself, but from the faces, and the words and manners of the attendants in the sick room, from the nurses, and visitors, and from the doctors. The sick room is now very properly ordered generally to be stripped as much as possible of any appearance of sombreness. The suffering one, whatever his disease may be, is to be won back to the life of

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which he is more and more inclined to abandon his slender hold—won back by light and gentleness, and sympathy, rather than repelled away by the melancholy spectres that too often crowd around his couch.

The world is growing better doubtless continually, and hence more cheerful. And if cheerfulness is increasing, sickness must diminish.

The disease that threatens Americans most is dyspepsia, I imagine. About the only cure for this is laughter, it is said. But the great difficulty is in laughing before it is cured. The cheerfulness in this case is more apt to come afterwards. It makes one sour tempered; how then can we be cheerful until we are rid of the disease. I said cheerfulness is a pleasant medicine; yes, but we cannot always take it, nevertheless; that is, we cannot always be cheerful, even when we want to be and try to be. It is easier to take the bitterest medicine sometimes. The physician may say to us, "be ye cheerful," but how shall we obey him? Alas! to purge us of doubt, of despair, this requires the greatest skill of all. To mend the broken spirit; this is what no earthly physician can do, perhaps.

A great deal is said about helping the poor, and the poor need help, but what kind of assistance do they need most? They want food, they want clothing, they want shelter. It makes us sad to think how many suffer on such a night as this from lack of fire and clothes, and meat; but I verily believe there is more suffering this hour, in this city, from want of sympathy, of a kind word, from something to lift the heart out of a black despondency, than from any other cause.

We have had the picture drawn for us often of the awful burden of toil and care which most people suffer in this country, business men especially, and of their need of more rest, and of recreation There is too much work for all working classes among us, but it is not hard work that wears men and women out so much as it is discouragement, a feeling that our work is of no account; that sad despondent feeling which makes life a drudgery. And when life becomes a drudgery it is almost sure to become a disease. To work well, to work strongly, successfully, we must work cheerfully.

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THE SANITATION OF THE HOUSE AS RESPECTS WARMING, LIGHTING, VENTILATION, AND PLUMBING.

By George Wirth, Architect, St. Paul.

At the request of Dr. Hewitt, I have endeavored to mention a few things in connection with the sanitation of the house.

Great interest is taken, at present, in household art; in decoration of interiors and in strange attitudes of extensions. Any one who has a new idea, or thinks he has, comes forth with a plea for art in the house; bewails the general want of taste, and sings the praises of "Old Gold," Peacock-blue, and wrought iron "Fire-dogs."

It is not fashionable to talk much about the sanitary influence of the house; indeed, much that is commended by our would-be artists is in direct violation of sanitary laws. Take, for instance, the use of large, deep porches. They are fashionable, must run almost around the house, and must be deep so as to give room for a hammock. They may, however, do a great deal of harm, for as a rule they shut out the light and warmth of the sun, making rooms inside gloomy and cheerless; and as if to render the fashion actually absurd, the owners of the large houses with big porches spend the real hot months in their summer and lake cottages, consequently never using these wide porches of their city homes.

This question of deep piazzas is a subject of importance in discussing the warming and lighting of houses. Any one who has lived in a sunny room and has had to change to one which never receives the sunbeams will agree with me that we can endure the direct rays of the sun in our rooms at least nine months of the year in this climate.

Let the carpets fade, if they cannot stand the rays of the sun; you will brighten the rooms with the rosy cheeks of your children and cut down the doctor's bills.

There is a chance for the ingenuity of architects in designing light open balconies, with light awnings for the hot weather, and porches with light open screen-work. In Italian country houses,

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the porch, as we use it is not covered; there are posts and piers overlaid with an open screen-work of rafters and beams which are covered in summer with awnings or growing vines, but which remain open in winter.

We should get much help from the sun in warming our houses if we would only accept it. The custom of doing away with inside shutters is a good one, as is also the fashion of having wide, generous windows with large sheets of plate glass.

The benefit arising from the use of air-spaces in the outer walls of our houses, is not sufficiently understood and appreciated.

In the houses built to rent to people of small means, we find often a neglect on this point, almost criminal.

Hundreds of the cheap houses "run up" during the last three or four years in the suburbs of these two cities have been built in such an outrageous manner that they are not fit to live in, even though they be painted in æsthetic shades and rented at sinful figures.

The cheapest houses should have proper beam filling, besides a double floor with a thick building paper between the boards so that the floor is tight and warm.

Double plastering is not costly and should be used in every house, as it creates a double air space, making the house warmer in winter and cooler in summer.

Windows with northern or northeastern exposure should always have double sash. One light of these storm sash should be hung to swing open for ventilation, as the small openings in the bottom rail do not sufficiently answer that purpose.

A house well inclosed with walls having proper air-spaces with tight and warm floors will be a healthy and comfortable home, easy to warm and easy to ventilate.

The usual way of warming most of our houses is by means of iron stoves, which heat by direct radiation.

Very few appreciate that the cheapest and simplest stoves can be used to give a steady supply of warmed *fresh* air and to ventilate the room at the same time.

A fresh air duct of matched boards run through the cellar to a point under the stove will supply the fresh air, and this coming up and passing around the heated stove becomes warmed.

The stove should be enclosed with a jacket of bright sheet metal, inside of which the air will come up.

A register in the floor or a valve in the duct will answer to regulate the inflowing air.

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The smoke-pipe should be used in ventilating the room by encasing it with a double pipe, thus conducting the air of the room which has been used into a smoke or ventilating flue.

The expense need be but little; and thus, with a little thought, every house could have a perfect system of warming and ventilation. It is strange that our stove manufacturers have not done more in this line instead of spending thought and money on mere designs and nickel ornaments.

The better class of our houses are as a rule heated only too well; that we have furnaces which can heat almost any house there is no doubt, but not enough attention is given to regulating the heat when once provided and to ventilation.

The latter has been written, and talked about a great deal, but not enough practical work has been done.

The principle of bringing in fresh warmed air is correct; but often, after this is done, the air is allowed to get over-heated, and there are no outlets provided for the bad air.

To warm the cold air in sufficient quantities, and to a proper degree, it is necessary to have a large enough heating surface; but at this point we are met by a very common fault.

The furnaces used are very seldom large enough. When it comes to buying the heating apparatus for the house, the owner is very often obliged to cut down in cost, and therefore buys too small a furnace; he might a good deal better have omitted the porches or the stained glass. A furnace which is too small wastes the *fuel*, *poisons the air*, and is *ruined* in a few years from overwork.

To properly ventilate the rooms, and to receive sufficient warmed air, it is necessary to have ample outlets.

For this purpose, there is nothing like the fire-place.

It may be as simple as you please, but nobody who has a house costing from $2,000 upwards can afford to be without them, and should at least have two—one in the living-room and one in the principal bedroom. They should be practically used, too, and not only made the receptacle of hand-painted tiles, etc.

The fashion of building chimneys outside of a frame house, or of any house, for a merely picturesque effect, is very absurd and wasteful, at least in our climate; wherever it is possible, the chimneys should be on the inside. The reason is evident.

The amount of heat wasted by smoke-pipes and chimneys is enormous, and many a room could be heated by utilizing the waste heat of smoke-pipes. A drum in a second-story room would often give as much heat as a stove.

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Besides this, the waste heat should be used wherever possible as a motive power in ventilation, in which service it often does its best work.

The cost of so using it need not be very great, and the benefit in health, and comfort is incalculable.

It may be asked, why do not architects introduce all these simple arrangements? Because an architect is apt to be popular now chiefly because of his odd and novel designs. People, in general, do not care much about sanitations, and are, therefore, unwilling to pay for it; hence, the architect must use his time in designing and sketching to meet the popular demand.

Plumbing is now much discussed, and its arrangement and oversight are becoming an important part of the duties of the sanitary engineer. It is easier to advise what *not* to do than what to do. Patent traps and sanitary closets there are in plenty, and *all* warranted, but there is a great deal to be done in remedying the work in houses built during the last ten or fifteen years. Let me illustrate by the plumbing I have lately had occasion to examine—the plumbing in a house plumbed four years ago. The soil pipe was ventilated into a brick chimney, in which ventilating registers were also placed from a living-room and a bedroom. All the gases and odors from the cess-pool and soil pipe were thus ventilated directly into these living-rooms with an effect which was sometimes terrible. It is a fatal mistake to run the soil pipe into a brick chimney; it should be run up to and above the roof, and should be perfectly tight.

Where it is necessary to use a cess-pool leave an opening on top of it to let in fresh air and for its ventilation. It is best to use as little plumbing as is possible, but have it of the best materials, and let it be done by a skillful, honest workman. Better have none at all than cheap plumbing.

Much work remains to be done by the health officers in examining the plumbing in the older houses. *This* I consider to be of more importance than the cleaning of back alleys, etc. If they have no legal right to examine houses at present, there should be a law enacted giving them the right and making it their duty to do it.

The inspector must be competent, of course, and it should be a misdemeanor for the owner of a house with bad plumbing not to remedy the defect, and he should be made legally liable for all damages arising therefrom.

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The greatest danger is in houses built in blocks, for rent; for the work is usually cheaply done and the plumbing is apt to be the worst part of the job.

Many houses with plumbing have no city water supply, and must often save in the use of the cistern water; thus closets and soil pipes are not sufficiently flushed and cleaned. It is therefore always important to have a large cistern and to have the gutters and pipes on the roofs large enough to take care of all the water which may fall during our heavy summer showers.

In building a comfortable house we may save in many things; but there are *four* parts of the house which cannot be cheapened —they must be *first-class* and *ample.* These are, the *foundations*, the *roof*, the *size* of the *furnace* and the *quality* of the *plumbing.*

THE REIGN OF LAW.

Paper read at Sanitary Conference, Minneapolis, December 7th, 1882.

By Hon. Sumner Ladd, of St. Peter.

The philosophic dictum that "Reason governs the world" was first enunciated by Anaxagoras, an Athenian philosopher, whose notions upon many subjects were crude enough, but who, by this expression was so fortunate as to give the first impulse to scientific thought. He described this "Reason" or "Nous" as the most pure and subtle of all things, as being infinite, self-potent, as having all knowledge and power, and that nature both in her hidden operations and in her visible phenomena, was ruled by this eternal intelligence. It is not strange that this conception marked an epoch in the annals of the human mind. Aristotle says of Anaxagoras as the originator of the thought, that he appeared as a sober man among the drunken, and Plato makes Socrates say: "I was delighted with the sentiment, and hoped I had found a teacher who would show me Nature in harmony with Reason, who would demonstrate in each particular phenomenon its specific aim, and in the whole, the grand object of the Universe."

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The original Hellenes brought into Greece from their primeval seat in Asia, a religion, which being transformed by the plastic imagination of that people, developed under its new conditions, became, as we know it, the religion of Paganism. Zeus from his seat on Mount Olympus ruled the earth, Poseidon the sea and Hades the underworld. A multitude of other gods and goddesses exercised special functions. The powers of nature were deified; both the wet places and the dry, the fields, the rivers, the forests, the mountains were filled, each with its peculiar divinity. Every city had its presiding deity. It was an age of mythologic faith. The Grecian world was in its childhood; and it was no more strange that the minds of men should be filled with crude notions and superstitious fancies than that a child listens to every nursery tale and believes it true.

To the thoughtful man of that age the world was flat, the sun no bigger than a shield, the stars mere specks of light no larger than they appeared; and while the minds of men began to grasp after the problem of creation, a riddle which still remains unguessed, the theories which were advanced regarding it were such as might be expected from the immaturity of a childish world.

Cotemporary with Anaxagoras were the Sophists, a race of rhetoricians, who traveled from place to place teaching crowds of eager young men that there was no law, no conscience, no good or evil, no religion. Men of eloquence were they, whose doctrines dressed in specious argument, produced in the mind that anarchy which frequently precedes a return to a more sober contemplation of the problems of life, of the future, of the value of conduct and of the principles of virtue in their relation to human happiness.

A permanent check to this delusive sort of reasoning was Socrates, who, while he ignored the physical sciences, by basing his system on morals, is said to have founded the first age of Faith in Europe. Two streams of thought flowed from the Socratic doctrine: one, the philosophy of Imagination, had its beginning in Plato; but Aristotle founded true science based upon induction. That painstaking and indefatigable mind, which sometimes overleaped the means at his command, laid the foundation of the fabric of exact knowledge, the advancement of which has employed some of the most beneficent minds of succeeding ages.

Alexander the Great was the pupil of Aristotle. That young Achilles of Macedon, the finest individuality of the ancient world, formed to every noble sentiment by his preceptor, having conquered Asia as far as India, was ovecome, in his turn, by its lux-

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ury and stung to death by its vices; but he had time amid his conquests to found Alexandria in Egypt, which soon became the home and centre of science and literature. To its celebrated museum flocked the learned from every part of the world. A vast library was collected; botanical and zoological gardens afforded facilities for those interested in those departments of physical science. A medical college was founded suitably provided with means for the dissection of the human body, the first institution of the kind in the world. Under the same roof, it has been said, were gathered geometers, astronomers, physicians, chemists, mechanicians, engineers, authors and poets. Many renowned names have come down to us. Alexandria was the conservator of the knowledge and literature of the world. That ancient city which has contributed within the current year, an interesting page to modern history, degraded, a would be foot-ball for the nations, the lion's paw upon it, while the sick man is permitted, through motives of policy, to wear the semblance of holding it in his nerveless grasp, through the munificence and generosity of its founder and its kings, though part of its science is lost, it has preserved to humanity some of the most priceless boons of its civilization.

It may be interesting, in passing, to note that the knowledge of those times threw its full light upon medicine. Hippocrates, who flourished before the foundation of Alexandria, had he lived in this age, would belong to the most advanced school of physicians, as he relied but little upon remedies, and depended mainly, in his practice, upon dietary and other hygienic remedies, and his extant works show, along with some crude notions no worse than several the world has not yet outgrown, a mind illuminated by a knowledge in the main correct, of the influences which produce disease; while Chrysippus and Erasistratus, the most famous of the doctors of the Alexandrine school, were opposed to the Empirics, bloodletting and active remedies, relying mainly upon diet and the *vis medicatrix naturæ*, and the latter by his anatomical experiments almost anticipated Harvey's discovery of the circulation of the blood.

While Hippocrates freed medicine from the shackels of superstition, an influence was awakening whose destiny it was to bring back the old empire of credulity. The progress of Roman power, by sapping the national life of every community, gradually undermined Grecian culture, which was spread among the countries of the Mediterranean sea, and finally when the second age of Faith was ushered in with the advent of Christianity, and the old Tuscan

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spirit, with a genius unparalleled for organization, passed out of the Roman state, in its degenerate days, and passed into the Church, and by means of the same pressure which had crushed out the genial life of the people in behalf of the state, the spirit of free inquiry was crushed out in behalf of religion; knowledge dwindled, its devotees became fewer, the Dark Ages cast their baleful shadow over the earth, and the light of science, flickering and inconstant, well nigh winked out.

Those who write learned books upon the conflict between science and religion might sharpen their arguments with ample proofs from the moral and social condition of the Middle Ages, only the contest was short-lived; religion soon gained the day, and there was little or no science left to compete with its great and all-powerful adversary. That the people were sincerely religious admits of no controversy; that they were debauched in ignorance appears on every page of the history of those times. Poverty among the masses (and the poverty of civilized life is luxury compared with it) entailed its fatal consequences of squalor, filth, vice, disease and death. Murder stalked at noonday, and its punishment, when it was punished, was graded in an inverse ratio, according to the rank of the murderer and the victim. Every highway swarmed with robbers and homicides. The condition of the knowledge of medicine will best illustrate the mental degeneracy of the age; its practice was the lowest form of barbaric sorcery and exorcism; its principal cures were effected by means of the canonized bones of old worthies, and men who had any knowledge of medicine were regarded as no better than atheists. As a consequence epidemics spread with fatal persistence. Italy and the shores of the Mediterranean were almost depopulated in the fourth century by a disease, upon the nature of which the small science of the times throws no light. The black death raged with appaling horror in the fourteenth century. A contagious disease whose origin was vice, spread over the entire continent in the fifteenth century. The small-pox was a perpetual scourge, carrying off one-tenth of mankind and disfiguring as many more. There were, however, some conditions which mitigated the general horror. The feudal system, while it oppressed, at the same time afforded protection; and the church, not entirely recreant to the teachings of its divine founder, gave succor to the helpless, and a refuge to those whom secular oppression had driven within its pale.

It is a singular fact that the twin factors of modern civilization, religion and science, no longer in conflict, had each its origin with

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the Semitic race. One branch of that race had served as slaves in Egypt for several centuries, and afterwards conquered and peopled the land of Canaan, their prophetic inheritance, though playing so insignificant a part in general history as to be scarcely ever mentioned by the ancient historians, has nevertheless conferred a religion upon that portion of mankind which has become the most civilized; but it may not be so well known that the light of knowledge was again brought back to the world by anotherbranch of the same race—the Arabian. The followers of the prophet, with their burning faith and their flashing scimitars, having wrested from Christendom some of the fairest portions of the earth, became liberal patrons of every branch of learning. Arabian science first emerged out of medicine; that is, the Arabians first cultivated that, and then every branch of science. They drew their inspiration from Alexandria, which preserved a recollection of its ancient erudition, and they collected, preserved and translated into Arabic many old manuscripts of classic authors which otherwise would have been lost. The Arabians founded a splendid empire in Spain, and philosophers, physicians. mathematicians, astronomers and grammarians arose and flourished. Moorish and Jewish travelers from Spain, some of them skilled in medicine and all versed in the knowledge of their enlightened country, gradually spread the seeds of knowledge throughout the continent. The sons of Christian kings and nobles, and a few famous ecclesiastics studied in Moorish universities; and the light from this monotheistic source penetrating little by little dark and enthralled Europe, gradually brought the minds of men back to an age of reason; and finally when that cultivated, refined, religious, but tolerant people were compelled to leave the land which they had adorned with cities, with universities, with gardens and works of art, and with a systematic and diversified agriculture, the the states of Europe impelled by that despoiled and exiled race, had entered upon a vast career of scientific investigation which has continued with an increasing zeal and an enlarging influence to this day.

I have thus briefly sketched the rise and progress of science, its wane, and its gradual emergence again into its proper rank and office in the world; and I have aimed, especially, to point out the necessary as well as historical connection of the profession of medicine with this movement of thought; and propose in the remaining pages of this paper to attempt, at least, to show the limits within which medicine can not be regarded as a science, the diffi-

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culties it may never hope to overcome, and the field within which its usefulness may be best exerted for the benefit of the race.

Of the three learned professions, that of medicine is the only one which deals with the laws and properties of physical nature. It holds a firmer ground than the profession of law, which deals with the abstract notions of right and wrong, often from an artificial stand-point of conventionalities, traditions, compacts and agreements. It has a more comprehensive purpose and a more difficult task than theology, whose essential principles, few and simple, are well ascertained and generally accepted. The physical laws of life, the diseases of man, the study of what nature suggests to expel them, is the province of the physician. He calls to his aid the other kingdoms of nature, the mineral and vegetable; other sciences interact with this; the crucible of the chemist makes manifest to him the conditions of life or death; electricity and magnetism may work their magic spell. The elements which surround man in the earth, the air and sunlight, each by the professional courtesy of nature lends to the physician its medicinal powers.

Most all the sciences bear upon the profession of medicine and surgery, either directly or by means of their analogies, and all learning it may be said, lends some utility to its practice. And especially is the physician indebted to the achievements of modern science and even to speculative philosophy, for principles which have been determined and laws which have been ascertained, which, while having relation primarily to other subjects, embrace in their comprehensive aim, the solution of the origin and development of disease, and suggest impliedly, if not the means of its cure, at least the means of its prevention.

But while the knowledge of medicine, like all knowledge which has a scientific aim, is based upon induction, that system of investigation which infers one general proposition from several particular ones, or as defined by Mr. Tyndall, sound reason sagaciously applied, it is apparent that there is a growing skepticism among intelligent people as to the utility of most customary remedies. It is very difficult to furnish scientific proof of the value of many medicines, difficult to furnish such proof of its inutility. The experiment is made upon the most complicated of machines, a machine endowed with vitality, strength, resistance, will. The accumulated energies resist the disease. Many cures are attributed to medicine which come about in spite of medicine. With his own ordinance the patient rakes and repels the enemy, while the physician's powder often flashes in the pan, or worse still, becomes

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a secret ally of the foe. Man, in his normal state, is a healthy animal, and the diseases to which he has become subject I apprehend to be attributable to three primary causes :—

First: The infraction of some law or laws pertaining to his physical organization. Second: Hereditary bias to disease,—and Third: His environment; or the conditions of soil, water, air, diet, and other circumstances which surround him, become measurably incorporated with his physical organization, and are calculated to produce disease.

Hereditary bias to disease presupposes some infraction of law by a remote or near ancestor or ancestors, or the presence with such ancestors of some of the conditions producing disease which are mentioned above as the third primary cause.

Has Nature appointed a drug to cure a man worn down by vice, or with vitality depleted by intemperance? His cure is abstinance, practical repentance. What physic has she decreed for hereditary disease? Fresh air, pure water, wholesome food, free exercise, and the observance of the sanitary laws of life; and some so afflicted outstrip in the race many persons of hale constitutions, whose confidence in their health is so great that they take no precautions to preserve it. I apprehend that works on therapeutics are necessarily most in use in cases of malarial, infectious, and contagious diseases. The enemy must be fought with his own weapons; poison must antidote poison. It may not be good for the patient, but may prove harmful to the disease. Means must be employed to compel or permit the escape of the virus. If there is a better tonic than good food, the organism must be strengthened to stand the pressure. Yet how often are wisely-directed efforts powerless in diseases of these kinds. At one time it was asserted by physicians in the Minnesota valley that recovery was not possible in a genuine case of diphtheria; they quoted from their local experience. But sudden diseases which infest neighborhoods are subject to the law which pertains to all things—of growth, maturity, and decay. Like the last run of grasshoppers in the same locality, enfeebled by luxury, they became so weak they could hardly fly; so diphtheria became enervated by dissipation, the type gradually grew less malignant and recurred at intervals in a milder and still milder form. Many remedies, including some of recent discovery, are valuable, if not indispensable; fortunate he who selects them; thrice fortunate the patient to whom they are administered. The true physician never arrogates to himself powers not his own. He never performs cures, but reverently

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stands by and observes how Nature may do that herself. It is only the credulous who believe in man's omnipotence, and the credulous are legion. The best medicine would be for the mind; it would involve the cure of all diseases.

"The spirit doth the body make."

Nature is the great restorer, and if she refuses to bring back health to the emaciated limbs no doctor need apply. Her punishments are neither cruel nor wanton; they are exactly proportioned to the offense. They are just but merciful intimations to the race, and her laws must be obeyed. She uses the skill of the physician as she does her other agencies to facilitate her restorative processes. He may even coax the great mother of us all, if the offense be not a mortal one, to be merciful and lenient to her son, who has devoured her living with harlots and wasted his inheritance of health in riotous living, but she can never be cheated or cajoled. She abominates an empiric, she abhors a pretender, and at times, no doubt, glances at diplomas from the learned schools with a suspicious scrutiny.

The wise physician is Nature's handmaiden, attentive to her wants; solicitous for her interests; swift thoughted and fleet of foot on her errands; deft in contrivances as auxiliaries of her powers and purposes; tolerant of her apparent capriciousness; gentle to her seeming faults; a rapt student and lover of her laws.

I will hazard the statement that in relation to her living organisms which have become diseased from whatsoever cause, the processes of Nature are curative; that she constantly and by well directed energies seeks to rehabilitate the impaired organ, and if the disease be not mortal, she will, either in one generation or another, under the prevalence of proper sanitary rules, and if necessary, by aid of the physician's skill, finally uproot and destroy the germs of disease and effect a permanent cure. I am the more willing to believe this of Nature because I have a great reverence for her; I know that she is generous, nay, bountiful, and that she takes a peculiar care of her children; that she is forgiving, long suffering, slow to anger, and is not so engrossed with her great purposes that she cannot turn aside to deeds of charity and mercy. The human body she has been patiently chiseling to perfection age upon age; armored it in strength, clothed it in beauty; its arteries, fine as gossamer, through which courses the vital fluid, is due to her engineering skill; its brain, her workmanship, is made fitting residence for the immortal spirit. This delicate machine she has surrounded with strong defenses, planted safeguards, and her forces

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are armed and equipped to man the battlements and force back, if possible, the insidious assaults of disease. Her mute creatures of the woods which men hunt and slay for mere pastime, she teaches to be their own physicians, and, when wounded or maimed by accident or man's cruelty, to seek out efficacious plants which soothe and cure. The scars made upon her face by the vandalism of man she heals over with verdant fields and waving forests, so that what was before a barren desolation becomes, under her magic wand, a thing of beauty and a constant joy. She has laid deep in her foundations fountains of medicinal virtues for man's healing. Her policy, dictated by immutable laws, is eminently conservative, preservative.

She sits at the elbow of the sagacious physician at the sick bedside; he hears her monitions and she seems to say: "This my child is thus brought low by sin, or crime or fateful circumstance. I formed and adjusted all his parts; every vesicle in his poor enfeebled body I fashioned, and even the hairs of his head I have numbered. Be sparing of thy drugs, kind assistant! I have not been able to make men know until this generation that they are of little or infrequent utility, many of them were first compounded by ignorance, often, nay, very often, they have been administered by stupidity; but thou knowest it and I need not caution thee; and thou knowest as well that there must be no tinkering with this delicate miracle of mine, lest it dissolve away. Let in my fresh air, but see that it be not tainted with man's pollutions. Let my bright sunshine smile upon his face, it will warm his heart and cheer his spirits; and let it not be sifted through close curtains or patent shutters, if his eyes can bear the light. Fetch water from my fountains, such as I myself compounded in my own laboratories, and bearing my trade mark, and let it not be impregnated with ashes, or sewage or sawdust. I have provided from my bounty wholesome food. Take it; but do not let it come to his lips mixed with cheap and poisonous adulterations; the criminal profits from their use might cast his enfeebled body into the grave. While thy notes are harsh and guttural, they may be bluff and hearty; but the musical tones of a woman's voice will best medicine his ear. Let thy face copy the glances of the sun; be cheerful. There is sanitation in a smile, and healthy contagion in a laugh; but a long visage and grim looks are as miasmatic as a swamp. Thou knowest somewhat of the psychological conditions of man and how mental states produce and prolong disease; thou should'st know more, but thy wit and culture can devise means

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to keep his mind from gnawing into itself. These, the rudiments. Improve upon them if thou canst; but try no experiments until thou takest my advice. My office is always open and consultations are free."

To many minds it may seem fanciful to lay such stress on the curative power of nature. It is no new thought, Hippocrates believed that there was in nature what he called a "psysis", a "spiritual restorative essence or influence," analogous or co-ordinate with the "nous" or "shaping spirit" which ruled the world of Anaxagoras. It was no myth of superstition, but a profound philosophic conception. The Jehovah of the Jews, or that power which makes for righteousness, though not interpreted as a physical healing agency was the other hemisphere of the same thought. On the confines of theism, we are hardly a step from pantheism. We may call this power what we will; the God of the Christian, the Jehovah of the Jew, the "shaping spirit" of Anaxagoras; to our experience it is implicit in nature, however much it may be above it. It is Providence not working by fitful chances, but constant and eternal, endowed with infinite wisdom, whose aim and design is the rational perfection of the world. It confers life upon all; it supports and sustains all. No one so foolish as to be outside its protection; no one so criminal as to be beyond its mercy.

Again, the principle of heredity, so far as it transmits what is vicious or malformed is curtailed by and finally yields to this power implicit in nature, Nature is constantly aiming to perfect her types, nor will long tolerate what traverses her purposes; and in the case of disease which descends from progenitor to offspring there is a constitutional limit to the entail, and the time comes when the taint is canceled from the blood. Were it not so, what an accumulated mass of evils would be imposed upon this generation. Our ancestors a century or two ago lived where malaria was prevalent, an incident of most new countries, and most of them shook with the ague. They swam, figuratively, and the figure is not far from the exact truth, in oceans of calomel. Many of them were addicted to extraordinary vices in extraordinary excess. And farther back in the ancestral home of the race, in that old Europe, which, with its dense masses of population is gradually becoming free, what diseases raged we have already seen. Sanitary laws were unknown; and while intercommunication was very limited compared with what it is at the present day, pestilences prevailed at short intervals everywhere. They were the spontaneous growths from the condition of life of the times.

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A horrible disease which had its origin in a social vice made prevalent in the West Indies by the presence of the Spaniards there, was brought from thence to Spain soon after Columbus discovered America, and spread like an epidemic all over Europe, assailing the high and the low, the rich and the poor, and sweeping hundreds of thousands into untimely graves. Its march was not along the great lines of trade like that of Asiatic cholera, but unbroken and all-embracing, covering the entire continent. The universal prevalence of the disease manifested the universal prevalence of the vice. And yet, while history gives us these facts in loathsome detail, it does not record that the succeeding generation was any feebler in mind or body than their ancestors. Doubtless it left its traces and entailed suffering for a few generations ; but Nature finally rehabilitated the race and bore it along towards its destiny.

Has the medicament of physicians toned up the race during the last five hundred years, or has Nature done it herself. She has done it ; partly through her inherent curative processes and partly by means of her sanitary laws, which a growing intelligence has gradually apprehended and observed. In the place of 2,000,000 lepers in France and 19,000.000 in Europe, four centuries ago, there are now none. Scurvy is almost banished. The ravages of smallpox are practically abolished by a scientific discovery, and pulmonary disease may yet yield to the same principle. Destructive pestilences are confined to barbarous and half civilized countries. Epidemics are hedged in by intelligence ; and the race goes forward with better auspices, better hopes, and better spirits.

Darwin builded better than he knew. His law, with the progress of Christian civilization is no longer a cruel Fate in whose nexus the weak are inevitably strangled and perish ; but it transcends the physical limitations assigned to it by its enunciator, and brings round in its cycles the redemptive agencies of knowledge, philanthrophy and charity, which after ages of struggle have demonstrated their ability to survive, and by means of these, which throw their protection about the weak, ameliorate the conditions of life and forefend disease. Nature has greatly increased the number of her selections and vastly enlarged the horizon of her beneficence.

A change is going on in the theory of disease and its treatment, as great, it has been said, as between the leapings, howlings, and rattle-shaking of the Indian medicine man and the practice of fifty years ago. The ablest exponents of medicine have broken away

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from the old blind faith in remedies, and the bulk of the profession, in theory and belief and, it is to be hoped, in practice, are fast following at their heels. But this change overtakes the profession when the difficulties of the future are vastly augmented by the errors of the past. The evils of heredity are an incubus upon the race which no treatment or exhortation can remove, and which the physician can only hope to render less oppressive. The primary law of health is right living, and the physician possesses unrivalled opportunities to direct conduct to this end. It may be said that the pulpit has thundered this time out of mind. Very true; and a strong conservative force it has been; but the argument has been directed to man's spiritual welfare. Let it be laid down as a condition of temporal salvation. Remote evils do not infringe upon the mind with half the cogency as those near at hand. The pulpit with its hundred spires in every considerable city reaches but a fraction of the people. Every palace, every hovel in the land, flings wide open its doors to the physician. He knows the secrets of the living and the dead; and myriads upon myriads come to his confessional. Let people be made to understand that they must obey the laws of health; that they must be sober, sane-minded, rational in their habits; that an ounce of prevention is better than a ton of cure; that the physician possesses no occult power to mediate between life and death, and that he has no panacea to rehabilitate a shattered constitution. Let these plain, palpable facts be thundered in their ears and driven home upon their consciences, and a reform radical and far reaching will be inaugurated.

The denunciations and anathemas of the great legislator of the old Bible were the utterances of a man who, from his familiarity with the oldest civilization of the world, knew the quality of sin and the degeneracy and destruction which succeeds the constant infraction of the laws of life. His sanitary legislation, although not entirely free from superstition, nevertheless exhibits him as the greatest practical statesmen of history, and the Jews to-day, as a race, are a living monument of his wisdom. The early Romans were a healthy and vigorous race, their habits of life simple. Women were held in the highest respect, as among the ancient Germans, and were the social equals, not the slaves, of men; and notwithstanding the seizure of the Sabine women, an early event which seemed a political necessity for the purpose of peopling the city, the social virtues of the Romans for several centuries were pre-eminent. The story of Lucretia is an indication of the estimation in which that people held social crime; and it is safe to say that

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these conquerers of the world, before they had become enervated by wealth, idleness, and luxury, lived, in the main, in accordance with the laws of Nature. The vices of Rome, however, when she had arrived at universal empire, and before her downfall, were horrible and prodigious, all classes sinking to the lowest infamy. Spain became corrupted and enfeebled, and lost her leading place among European nations by means of the same causes by which she had acquired it, the pouring in of wealth from her American conquests; and England, in the last century, ran a narrow chance of meeting the same fate, through the same colonial cause, her possessions in India stimulating the most excessive greed, and being the source of the most prodigious fortunes, acquired by cruelty, rapine, and murder.

The American Indians, driven from place to place, half famished, low spirited, are fast perishing from the earth, and the consuming fires of alcohol will, in a few generations, complete their destruction. Turkey, the terrors of whose might once shook and alarmed all Europe, is emasculated, brought low, and exists to-day only by the sufference of nations, by reason of a degrading social system. Our large cities are degraded states in miniature; the rich corrupt the poor, and the poor corrupt the rich; and among the middle class there is a growing moral pollution, which needs only to be known to be appreciated.

Religion, among the masses, is an excellent sanitary agency; when the conscience is restrained, vices will be few. Freethinkers may readily concede this. But when a state grows old, many of the wealthy classes, though outwardly attentive to its forms, are practically beyond the influence of religion, and are without any compensating faith in the moral elements which hold the world together. I do not mean to say that this class, from which none of us are willingly excluded, does not possess many admirable traits and furnish many examples of genuine manhood. I am only speaking of the general tendency of wealth. A corrective is manifesting itself with good results. Vast enterprises are carried on by wealth which, though intended for further accumulation, are, in practical effect, public benevolences; and in these enterprises it enforces a discipline as salutary as hygiene. The nobility of England take pride in spending a considerable part of their incomes on their estates, which in reality is for the benefit of their tenants; and there is a growing feeling in this country among the wealthy that the chief object of riches is not the gratification of the senses and passions of satiety, and an increasing sensitiveness

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to public approbation, when money is bestowed for the endowment of charitable or educational institutions, or in other respects for the public good. A generous emulation in this direction will be productive of much utility ; it will create an escape for the germs of vice. When liberality to good ends becomes a habit, wealth will be shorn of half of its mischief. But poverty and wealth, the two extremes of society, will, no doubt, for many generations be the prolific source of abominations, crimes, physical suffering, disease and death ; and while it is true that civilization has lengthened the average duration of human life because it has spread a moderate amount of its advantages more generally among the masses, and awakened an intelligence active and philanthropic in efforts for the amelioration of mankind, it is also true that it puts forth agencies and affords means for unbounded gratifications, which in times past have eaten out the heart of nations.

How permanent progress may be reconciled with civilization, is a question of vital importance suggested in a country like ours, with its complex society, its diverse interests all tending toward one or two aims, its poverty and wealth, and its popular form of government lending unusual opportunities for the operation of debasing influences. Its solution, I believe, lies at the foundation of the work for the consideration of which this council is convened. The springs of moral rectitude are in physical rectitude; physical and moral forces interact, and a people which are healthy and vigorous also possess the cardinal elements of moral strength. It behooves, then, the philanthropist and especially the patriotic statesman, not like Demosthenes or Brutus, to struggle for a country's liberties which are irrevocably lost, but to labor earnestly for the preservation of the liberty which remains; and to that end they will influence wealth to enter those channels where it will produce the least corruption and accomplish the most good; loosen the bonds of poverty by inducing the aids of temperance, health and prudence; lead politics to a higher plane than party strife for spoils; direct legislation not solely with a view to the punishment of offenders and the regulation of property rights, but to such measures as will gradually abolish offences and render life and property secure; and to the enactment of laws, which, without curtailing the true liberties of the people, shall, by their salutary operation, make men better physically and morally, and thereby ensure a larger and more rational liberty.

In relation to the third cause of the origin of disease, that of man's environment, or the conditions of soil, water, air and die

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which surround him (and here we might include many circumstances of life which affect his mind and spirits), we will see that the principles here governing are but an adaptation of Darwin's law of the influence of surrounding circumstances on living organisms. This influence in relation to disease I apprehend to be twofold:

First. The environment often spontaneously produces disease.

Second. Differences in the nature of the environment produce varieties in the form, type, phase and malignity of the disease.

Even ignorant people know that a swamp, a standing pool, a well filled with surface water, a damp cellar, and the presence of decaying vegetable or animal matter, and many other circumstances will produce disease.

I do not positively know whether I state the experience of physicians; but if we follow out Darwin's law to its necessary conclusions, the same disease will assume different forms and varying types of malignity in different localities, on account of differences in the environment producing or affecting the disease. Typhoid fever may, for instance, take on one phase in Minnesota and another phase in Michigan. Diphtheria may be more virulent in Mankato than Saint Peter, or vice versa. The skill of the physician may, at times, be completely baffled by an entirely new phase of a well-known disease; but the type and malignity of a disease prevalent in any one locality and under the same local influences is practically the same, the differences which exist being attributable to constitutional differences in the patients; and here it will be seen, too, that constitutional or hereditary bias to disease is one of the elements of the environment, and may and probably does materially affect the type or malignity of any disease; and necessarily, if there is an absence of the conditions which produce a given disease in a given locality, such disease will never occur there, unless it be contagious.

Man himself would never have existed on the earth had not the conditions for his existence been favorable. The crude notions of our youth take their flight when the conditions which produce them cease. Myths and mythologies and the opinions of barbaric ages pass away when new conditions of intelligence expel them from the human mind. Many species of plants and animals whose fossils are the hieroglyphics of the rocks have existed in geologic time, but have passed away never to return when the conditions suited to their continued existence passed away; and so will disease pass away from the earth, if ever, when the conditions of its existence are eliminated from man's constitution and from his environment.

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But disease is in the world. It rankles in the blood, brought there by the sins of the forefathers. It festers there on account of our own violation of natural laws. It lies wallowing in heaps of putrid filth in towns and cities. It skirts the miasmatic swamp and reeking pool, and laughs its laugh of demoniac joy when the morning and evening exhalations rise. It sits upon our thresholds, lazar-like, with outstretched arms and horrible eyes. It coils its loathsome length among our little ones and pitilessly strangles and destroys. Its infectious breath pollutes the air so that we breathe the germs of death. It lurks where peace and joy and festivity reign, and turns laughter into bitter wailing. What shall we do with the monster? The answer is, do what we can; and if we do that we will accomplish much.

We may rest assured that Nature will not oppose the labor, nor place barriers to its accomplishment. In her loving kindness and prescient care, she laid the foundation for this work before she had prepared the world for us. Before man's voice was heard in the earth, long before any of his petty empires had had their beginnings, she had, with Titanic strength and elaborate skill, cut vast channels the length and breadth of every land, into which the smaller streams and little rivulets and the copious rains which wash the earth of man's pollution might run; and so that all habitable places near stood on higher ground; and into this vast natural sewerage system of the world, man may, with comparatively little labor, spew out from his habitations and from his filthy towns and cities most things dangerous to health or offensive to the senses, which purifying as they go, may finally reach the great salt sea. She has laid deep in her foundations vast natural aqueducts and thick strata of porous rock which receive and transmit much of the waters which fail to flow into the rivers. And the comminuted earth which for ages she has been preparing to give life to plants as food for man and beast, she has made a perfect disinfectant of all disease, so that those hateful substances which breed disease, when received into its bosom are shorn of their fatal and pestilential powers, and now become a benefaction, by enriching the soil for growths of beauty and utility. She has given the clear sunshine, the falling rain, the pure air, the fruitful earth and has given birth to man himself, and constituted him one of her natural agencies, and the God of Nature has bestowed upon him reason, intelligence and strength, wherewith he may, if he will, keep his inheritance clean and sweet and beautiful, so that disease may not dare to tread on the green or snow white carpet of his habitation.

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Man produces the serpent which stings him to death. He impiously violates Nature's laws; he sacrilegiously dashes out his own life through folly or recklessness. By reason of his criminal sloth or negligence, disease breeds from his surroundings. Most pestilences, no doubt, have their origin in vice or filth; and the innocent suffers with the guilty. It is not Nature's work, it is man's own; he corrupts Nature and renders her kindness abortive. If he would temper his spirits to her equable laws, this would all be changed. She will bring the reformation about herself in due time, no doubt; but it is the duty of noble men and women to do what they can to hasten the day.

Napoleon, in one of his conversations with his physician at St. Helena, illustrated how comprehensive a mind was lost to science when he turned his attention to war. The discussion having turned on the cause of pestilence and the difference between pure and impure air, Napoleon exclaimed: "How! is it not known what in an aeriform state wounds such and such an organ? Has no attempt been made to isolate the fatal principle?" "The attempt has been made," replied the physician, "but in vain; it is too subtile." "But," rejoined Napoleon, "the atmosphere which surrounds a person infected with the plague cannot offer the same elements of composition as that of a healthy individual."

Modern science has isolated the fatal principle, and now it remains to destroy it. Let the conditions which give origin to the fatal principle be cut up root and branch. It may be said that it is impossible so long as men are ignorant, and are not willing to live in harmony with the dictates of reason. Very true! But if the fatal principle cannot be completely destroyed, it may be hedged in, especially in civilized communities. Let municipalities be clothed with reasonable laws and ample powers to enforce them, and let them be enforced. Let ministers, without omitting the weightier matters of the law, preach occasionally a sanitary sermon. Let one-half the idle time spent by strong laboring men be devoted to sanitary reform in their own homes, and their households may remain intact—and the poor love their children. Let a festival be gotten up, if need be, to remove a pool of stagnant water, as well as to buy a church organ. Money spent for sanitary reform is money saved in the end; it is life saved, too. It will greatly decrease crime, that financial burden to the State, it will immeasurably increase the productiveness of labor. Such a tax paid for health will return a hundred fold.

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The State Board of Health of which this Council is an agency for the purpose of popularizing the movement is founded upon a recognition of the general truths I have spoken, however much I may be presumptious or in error in many minor statements. The writings of Bentham, though no lawyer, were the cause of many reformatory changes in the laws of his own and other countries, Charles Dickens, though not a legislator, by depicting the horror of poor debtor's prisons, cancelled the disgrace from the statute-book of England; and Cowper, with the pen of a poet, did as much to abolish the slave trade as all the statesmen of Europe; and while many eminent men in science, though not physicians, have, by their biological researches and bringing to light the germs of infectious and pulmonary diseases, laid the foundation for great progress in hygiene; still it is to the enduring honor of the medical profession that sanitary reform, the success of which necessarily curtails its fees and diminishes its income, originated with it. It owes its origin, its progress its rank and its beneficence to Science, and it is owing to the large understanding which science imparts and which knows no self interest, that has led to this hygienic departure in medicine. The physician in this movement needs the co-operation of all good men and women of every class. Nature, however, is his great coadjutor and she needs his skill to direct men aright. And when everywhere men are reverent to her laws, and not till then will his mission be at an end; but that time will not be in this generation or the next; perhaps it may never be. But to those who, believe that the aim of universal history is the development of freedom, freedom in its widest acceptation in subordination to law, the future appears with a golden promise, the ideal of which is a time, perhaps in the far distance, when all men shall profoundly acknowledge, in their lives, in their conduct, and by their faith, the truth of the dictum of the old Greek sage that "Reason governs the world."

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GENERAL REPORTS OF HEALTH OFFICERS

After the arrangement of the index it was found that so large a proportion of the contents of Health Officers' Reports came under the heads of Small Pox, Vaccinations and Diphtheria that the remainder are not of sufficient importance for presentation separately here. This department is therefore omitted from the report.

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2. Manual of Hygiene. Cameron. 1874. 8vo. 475 pp.
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4. Manual of Public Health. Hart. 1874. 8vo. 374 pp.
5. Hygiene and Sanitary Science. Wilson. 1877. 8vo. 490 pp.
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7. Lectures on Public Health. Mapother. 1867. 12mo. 664 pp.
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2. Medical Statistics of Provost Marshal General's Bureau. 2 vols. 4to. 568 pp. 768 pp.
3. Circular War Department, Surgeon-General's Office.

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37. Tracts on the Plague. Mead. London. 1720,
38. Jenner et la Vaccine. Lorain. Paris. 1870. 48 pp.
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40. Inoculation of Cowpox. Bryce, Edinburgh, 1809. 214 pp. Appendix 132 pp.
41. Jenner on Inoculation. London 1801. 182 pp.
42. A Treatise on Small Pox and Measles. Rhazes. Translated by Greenhill, London, 1848. 212 pp.
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3. Air and Rain. Smith. 8vo. 593 pp.
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5. Report of Chief Signal Officer War Department. 1871-72-73.
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7. Ozone and Antozone. C. B. Fox. London, 1873. XVI-301.

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LIST OF

CHEMICAL AND PHYSICAL APPLIANCES

BELONGING TO THE LABORATORY OF THE

STATE BOARD OF HEALTH.

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LIST OF CHEMICAL AND PHYSICAL APPLIANCES.

1 Anemometer.
1 Balances for Analytic Work.
3 Burette's Mohrs.
8 Beaker glasses.
24 Bottles, small, glass stoppered, for special reagents.
12 Bottles, medium, glass stoppered, for common reagent.
12 Bottles, large, glass stoppered, for standard solutions.
2 Bunsen's burners.
1 Condenser, block tin and zinc for retort.
1 Condenser, block tin and zinc for still.
1 Cylinder, 200 c. c. graduated.
1 Cylinder, 100 c. c. graduated.
4 Cylinders for nesslerizing.
1 Crucible, platinum.
1 Evaporating dish, large, platinum.
8 Evaporating lishes, porcelain.
4 Funnels, small.
1 Funnel, large.
5 Flasks, 8oz.
1 Flask, 100 c. c.
4 Pair forceps, iron.
1 Furnace, gas.
1 Measure, 8 oz., liquid
1 Mortar, glass.
2 Oil testers.
3 Pipettes, graduated.
6 R torts, glass.
1 Ring Stand.
1 Still, heavy coppper with nickel plating.
2 Specific graduating cylinders.
2 Spirit lamps.
1 Spatula.
2 Spirometers.
1 Pair scales, with walnut case.
16 Test tubes, 6-inch.
2 Test tubes, 4-inch.
27 Feet tubing, rubber.
1 Test tube rack.
1 Triangle wire.
1 Wash bottle.

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REPORT OF THE SECRETARY.

It was thought best to print in full, the more important reports of Local Health Officers, though they relate largely to work of suppressing Small Pox. Few, even physicians, appreciate the difficulties with which Health Officers have to contend in dealing with a dreaded infectious disease. It is to enable people of all classes to form an opinion of this important matter that the Local Health Officers' Reports are herewith presented. But further than that and more important, these reports point very clearly to matters which demand remedy, in the provisions for the care of the unfortunate sick.

The work of the State Board of Health has under existing laws, been to support and assist the local authorities and chiefly local Health Officers in their work. To this end no time or labor has been spared, and the Board have the satisfaction of knowing that real help has been given.

The question of further legislation so long discussed is likely at the present session of the Legislature to receive a practical answer.

Under the instructions of the Board the Secretary has prepared and presented to the Board the form of a law consolidating and adding to existing laws relating to public health.

The present disjointed legislation in the various laws of different dates, had two origins.

1st. Some were copied from the laws of older states when Minnesota was organized.

2d. Some have been added from time to time under the stimulus of some one or more diseases prevailing as epidemics, in one or more parts of the State. Since the organization of the State Board of Health none of these laws have been submitted to its revision.

The result has been from the above causes great confusion, so that it is difficult to define the duties prescribed, or to find methods prescribed for their performance. The proposed law as to epidemic and infectious diseases, defines the duties of State and Local Boards

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of Health and their relations to each other, and of Local Boards between themselves; it prescribes so far as practicable, the methods of work; defines responsibility and upon whom it rests; answers the vexed question of individual, town, county and state liability, for the care of dependent persons sick of infectious diseases, and clears up many other questions which experience has shown to require answers. If this proposed act becomes a law, a long step in advance will have been taken.

There will still remain the most important work of Boards of Health and Health Officers, the sanitary oversight of centers of population, small and great, for the purpose of *preventing* so far as may be the occurence of ill health and premature death.

This work is the removal of the secondary causes of sickness as distinguished from their esential or specific causes.

The distinction does not always hold, and secondary causes as they are called—dampness, foulness of air, water, soil, manure, &c. are very often the essential causes of our most fatal diseases, especially of children.

This work consists therefore in the care for the abundance and purity of the air and water supply—by means of the prompt and harmless disposal of all refuse matter, solid or fluid from within and about houses and towns.

To this end the State Board of Health should be given as in Massachussetts, the sanitary supervision of the waters of the state used for drinking or other domestic use, and that the Local Boards of Health have the same functions in their respective jurisdictions.

As will be seen the details of most of the work here referred to belongs to the Local Boards.

It has been constantly necessary to remind local authorities that their Boards of Health have, in these duties, a constant, various and important work to do, compared with which as a means of public health, the more public and evident work of dealing with infectious diseases, though necessary and important, is of much less consequence. The people and their local authorities constantly find, that it is in the everyday life and surroundings of communities, as of families and individuals, that we are to look for the most common and constant causes of their sicknesses. And it is just here that health officers, *where there are any*, find the least popular or official encouragement for hearty and constant work.

As a consequence, there are very few active local boards of health in the state. It would be nearer our experience and the truth to say there are none.

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The sanitary activity, if any, is in the health officer who finds his work almost at a stand still, unless he can show an impending or existing epidemic as reason for a brief, spasmodic activity of his Board. The proposed law will change this a little but will not take the burden or real responsibility and work off the shoulders of the health officer. With increased popular sanitary knowledge this state of things cannot much longer exist without protest and attempt at remedy.

From our experience it seems probable that the increasing importance of the duties will make local authorities more ready to provide for their regular and worthy performance. No effort should be wanting on the part of every good citizen to further this end.

Diphtheria is still lurking in various places. After long and persistent efforts, medical men are agreed that it should be dealt with as infectious. The great majority believe it to be very infectious, and often powerfully so. The State Board of Health, after a careful study of its behavior for the last ten years, is convinced that the only way successfully to combat it is to deal with it as *very* infectious, and by the seclusion of sick, quarantine of families, if need be, till all probable infection has been lost or destroyed Through disinfection and cleanliness we have the best prospect for its control.

To this end, by circulars of instruction, by essays in journals, societies, sanitary conferences and the like, the subject has been kept constantly before the physicians and the people.

The disease is recognized as infectious in the proposed law; and there is a strong and growing sentiment in favor of the most rigorous measures for its prevention and control.

Small Pox. At this date, Jany. 1, 1883, this disease exists in but two places in the State, one in Isanti county under control, the other in the lumber camps above Aitkin.

That district is as yet unorganized into townships, and it may be difficult to enforce any regulation, but this board expect to be able to control the outbreak by quarantine and vaccination, if the men can be kept in the camps, and our efforts are supported by the co-operation of the lumber firms by whom they are employed. The greatest danger in such cases is panic, by which, among other evils, the disease may be carried to other districts, by men fleeing from the danger. Against this danger effective measures will be taken.

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The Library of the Board. By direction of the Board the Secretary has added from time to time such books as are needed for our work. Consultations upon all sanitary questions are so frequent that the library is one of the most important assistants in our work.

The Laboratory. Water analysis has been the chief work done during 1881-2, both with reference to supposed disease cause contained in the water, and as to other sanitary questions. Taken altogether the outlook for sanitary work in Minnesota for 1883, is more encouraging than ever before. The Sanitary Council whose proceedings are herewith furnished is proof of that fact. The inreased activity of medical men as proven by their correspondence with the Secretary is another evidence, and the letters for advice from the people, largely from mothers of families, is still another encouraging feature of our work. What we need now, are

1st. More and more active local boards of health.

2d. Physicians having a taste for sanitary work as health officers.

3d. Local sanitary associations in our principal towns.

4th. More active co-operation on the part of medical men.

There are a few scattered over the state who are doing something under great difficulties. More are needed. The local medical societies might do a great deal in support of the local health officer.

We go on to another year's effort with the feeling that it will mark advance in one or more of these ways.

CO-OPERATION AMONG STATE BOARDS OF HEALTH.

The secretary in 1879 brought this subject to the attention of the Sanitary Council of the Mississippi valley, and served as chairman of a committee, making a report, but no steps have yet been taken. Some of the reasons are apparent. The time is not far off when such co-operation will be called for by the very men who were then opposed or indifferent to the measure.

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INDEX.

Albert Lea, Freeborn County.
Small pox in history of by Dr. A. M. Burnham 73
notice published by local board of health 74
Analysis
of water made in the laboratory of board
of wells 169
of rivers 170
of springs 170
of cisterns 170
of flowing wells 171
Average of wells where more than one analysis was made for a place 171
Appendix A.
Small pox in Isanti Co 118
Appendix B.
Letter relating to small pox from Nels Lawson, Town Clerk of Cambridge, to Sec'y 122
Appendix C.
Isanti press notice 122
Barto A. Ex State Gov.
Letter to Dr. Hand relating to small-pox at Spring Hill 28
Becker Co.
small pox in 105
statistics of Lake Park 105
detailed report of by Dr. J. H. Carson 109
Beebe Dr. W. L.
report of small pox as H. O. of St. Cloud, Stearns Co. 44
report of small pox as H. O. of Albany, Stearns Co 45
Big Stone County.
small pox in 67
statistics of 67
Bloomington, Hennepin County.
history of small pox in 102
Blue Earth County.
history of small pox in towns of Sterling and Le Roy 72
statistics of 72

Digitized by Google

Breed, Rev. D. R., of St. Paul.
"Recitations for busy men," a paper read at Sanitary Conference at Minneapolis..... 257
Brown, Dr. J. E.
Report of Small Pox in Isanti Co.,..... 119
"History of an Outbreak of Small Pox in a Rural District," a a paper read at the Sanitary Conference at Minneapolis..... 221
Brownell, Dr. W. D.
reports small pox in Rich Valley..... 82
Burnham, Dr. A. M.
report of small pox in Albert Lea, Freeborn Co..... 73
report of small pox in M'Cauleyville, Wilkin Co..... 77
letter to Secretary,..... 79
Cambridge, Isanti Co.
Small pox in 122
correspondence concerning small pox.....122-124
Campbell, Dr. J. E.
Abstracts from report on small pox in Stearns Co., town of Melrose..... 39
Capehart, Dr. H.
Report on small pox in southern Dakota.....
Carl, Dr. B.
Report on trichinosis at New Ulm 181
Carson, Dr. J. H.
Report of small pox at Lake Park Becker Co..... 109
Catalogue of library of board..... 295
Chisago Co.
Report of small pox in, by Dr. Alf. Fliesbug..... 127
Clark, Dr. T. C.
Report of small pox in Stillwater. 63
Cockburn, Dr. J. C.
Letter to Secretary relating to report on small pox..... 94
Report on small pox in Hennepin Co..... 94
"The work of a city Health officer," a paper read at Sanitary Conference at Minneapolis..... 197
Conley, Dr. A. T.
report on small pox in Dakota Co..... 24
"Duties and Difficulties of a Village Health Officer" a paper read at Sanitary Conference at Minneapolis..... 204
Cook, N. M.
letter to Sec'y Hewitt relating to Small Pox in Isanti Co..... 123
Cottonwood Co.
Small Pox in..... 69
Crystal Lake, Hennepin Co.
statistics of Small Pox in..... 100
history and report of Small Pox in, by Dr. J. C. Cockburn.... 101

Digitized by Google

Culdrum, Morrison Co. 129
statistics of Small Pox in 129
report on Small Pox in, by Dr. W. H. Ewing 131
Dampier, Dr. C. E.
reports Small Pox at Poplar River, Polk Co. 104
Dakota Co.
report on Small Pox in Douglas tp., by Dr. Conley 124
statistics of Small pox in 124
Davis, Dr. E. J., member State Board of Health.
visits towns of Sterling and Le Roy infected with Small Pox .. 72
Denmark, Washington Co.
Small Pox in 64
Diphtheria.
general report on 12
fatality of 12
report on in Minneapolis by Dr. J. C. Cockburn 177
statistics of April-December, 1882 176
secretary's report 312
Disinfection.
method of at Spring Hill 37
results of insufficient 43
method of at Luxemburg and Eden Lake 51
at Lake Park 106
Dobbin, Rev. James, Rector of Shattock School
"Method and Result of Physical Training in Shattock School," a paper read at Sanitary Conference, at Minneapolis 230
Douglas Township, Dakota Co.
report on Small Pox in, by Dr. A. T. Conley 24
Du Bois, Dr. C. E.
report on Small Pox in Stearns Co. 31-38
Duluth
report on Small Pox in, by Dr. V. Smith 103
Dunn, Dr. James H.
a paper on results of Vaccination and other notes on Small Pox in Scott Co 139
"The Experience of a Country Health Officer in dealing with an Epidemic of Small Pox," a paper read at Sanitary Conference, at Minneapolis 215
Emerald, Fairbault Co.
Small Pox statistics and History of in 146
Ewing, Dr. W. H.
report of Small Pox in Morrison Co. 131
Fillmore Co.
statistics and History of Small Pox in 91
Financial Statement 1881-82 19
Fish Lake, Chisago Co.
report on Small Pox in, by Dr. Alf Fliesbug 127

Digitized by Google

Fliesbug, Dr. Alf.
report of outbreak of Variola, at Harris, Chisago Co..... 127
Fort Ripley, Crow Wing Co.
history and statistics of Small Pox in..... 145
Freeborn Co.
history of Small Pox in, by Dr. A. M. Burnham..... 173
Granite Falls, Yellow Medicine Co.
statistics of Small Pox in..... 66
history of S. P. in..... 67
Hand, Dr. D. W., President State Board of Health.
Hector, Renville Co.
history and statistics of Small Pox in..... 70
Hennepin Co.
History of Small Pox in..... 94
Hewitt, Dr. C. N. Secretary State Board of Health.
letter to Dr. J. A. DuBour relating to small pox at Spring Hill 29
letter to E. J. Brown, relating to small pox in Isanti Co..... 118
went to Montgomery April 25th, 1882, in regard small pox... 86
went to Crystal Lake with Dr. Cockburn to investigate small pox, April 27th, 1882..... 101
letter of transmission to the Governor.....
Vaccination; what it is and what it has accomplished in Minnesota, 1881-82..... 182
report as Secretary of Board..... 310
Hokah, Houston Co.
statistics and history of small pox in..... 53
Hospitals for infectious diseases..... 11
Houston Co.
statistics of small pox in towns of Hokah, LaCresent and Union..... 53
history of small pox in..... 53-62
Hygiene
popular education in..... 17
in schools..... 17
Isanti Co.
statistics and history of small pox in..... 114
Jacques, A. G., of Sauk Centre.
services of in outbreak of smali pox in Stearns Co..... 34
Johns, Rev. D. C., President of Hamline University.
"A Plea for Fresh Air and Exercise"—a paper read at Sanitary Conference at Minneapolis..... 244
Kiehle, Hon. D. L., Superintendent of Public Insiruction.
"Hygiene in common schools, what shall be taught and how much"—a paper read at Sanitary conference at Minneapolis.. 226
Laboratory of the Board..... 15
chemical and physical appliances..... 308

Digitized by Google

LaCrescent, Houston Co.
statistics and history of small pox in..... 53
Ladd, Hon. Sumner, of St. Peter.
"The Reign of Law"—a paper read at Sanitary Conference, Minneapolis..... 273
Lake Henry, Stearns Co
statistics and history of small pox in..... 30
Lake Park, Becker Co.
statistics and history of small pox in..... 105
Lanesboro, Fillmore Co.
statistics and history of small pox in..... 91
Laws.
relating to small pox in Stearns Co..... 47
Lawson, Nels.
letter to Secretary reporting small pox at Cambridge..... 122
Leonard, Dr. W. H.
report on Meteorology of Minnesota for 1881-82..... 147
Le Roy, Blue Earth Co
statistics and history of Small Pox in..... 72
Le Sueur Co.
statistics and history of Small Pox in Montgomery tp..... 84
Lethart, Father Ambrose
services of at Spring Hill..... 32
Letter of transmission to the Governor by the Secretary of Board... 3
Library of S. B. of Health
description of.....15-16
catalogue of..... 295
Loetke, Father, of St. Martin
services of, Zion tp..... 42
Maple Ridge, Isanti Co.
statistics and history of Small Pox in..... 114
McCauleyville, Wilkin Co.
statistics and history of Small Pox in..... 76
McGolrick, Rev. James of Minneapolis.
"Pastoral duties in relation to Hygiene"—a paper read at Sanitary Conference, Minneapolis..... 253
McLaren, Rev. R. F. of St. Paul
"The Relations of Religious to Physical Culture"—a paper read at Sanitary Conference Minneapolis..... 248
Members of State Board of Health..... 4
Meteorology of Minnesota.
report on by Dr. W. H. Leonard..... 145
Minneapolis.
statistics and history of Small Pox in..... 94
Mongomery, Le Sueur Co.
statistics and history of Small Pox in..... 84

Digitized by Google

Morrison Co.
statistics and history of Small Pox in..... 129
Nurses for the sick of infectious diseases 12
Olmsted Co.
statistics and history of Small Pox in..... 65
Ortonville, Big Stone Co.
statistics and history of Small Pox in 67
Palmer, Dr. B. R. of Sauk Centre
experience in collecting humanized virus..... 184
Perz, Barth, Commissioner of Stearns Co.
energetic and effective work in suppressing the epidemic of Small Pox, in Stearns Co..... 51
Pierz, Morrison Co.
statistics and history of Small Pox in..... 134
Polk Co.
report on Small Pox in..... 104
Poplar River, Polk Co.
report on Small Pox in 104
Red Wood Co.
statistics and history of Small Pox in..... 112
Renville Co.
statistics and history of Small Pox in..... 70
Report of Secretary of Board..... 310
Report on Metorology of Minnesota for 1881-82, by W. H. Leonard, M. D. 145
Richmond, Stearns Co.
statistics and report of Small Pox in 26
new outbreak of Small Pox in..... 43
Rich Valley, McLeod Co.
statistics and history of Small Pox in..... 82
Rochester, Olmsted Co.
statistics and history of Small Pox in 65
Salisbury, Dr. J. H.
appointed Health Officer of Crystal Lake..... 101
report on Typhoid Fever, in Minneapolis 172
Sanitary Councils General Report.....16-17
at Mankato, October 17, 18, 1881..... 16
at Albert Lea, August 31 and September 1, 1881..... 16
at Minneapolis, December 6, 7, 1882..... 16
place of meeting 193
programmes..... 194-195
Dr. J. C. Cockburn's paper on "the work of a City Health Officer" 197
Dr. A. T. Conley's paper on duties and difficulties of a Village Health Officer..... 204
Dr. A. G. Slagle's paper on "Popular aid in prevention of diseases."..... 210

Digitized by Google

Sanitary Councils, continued.
Dr. James H Dunn's paper on "The experience of a country H. O. in dealing with an epidemic of small-pox"..... 215
Dr. E. J. Brown's paper on "The History of an outbreak of S. P. in a Rural District."..... 221
Hon. D. L. Kiehle's paper on "Hygiene in Common Schools." 226
Rev. James Dobbin's paper on "Methods and Results of Physical Training in Shattuck school"..... 230
Prof. L. B. Sperry's paper on "Some of the Dangers to Health incident to our Present Methods of School Education..... 235
Rev. Dr. D. C. John's paper on "A Plea for Fresh Air and Exercise."..... 244
Rev. R. F. McLaren's paper on "The Relations of Religious to Physical Culture."..... 248
Rev. C. T. Van Anda's paper on "Harmony between Piety and Sanitary Laws."..... 251
Rev. James McGolrich's paper on "Pastoral Duties in relation to Hygiene."..... 253
Rev. D. R. Breed's paper on "Recreation for Busy Men."..... 257
Rev. J. H. Tuttle's paper on "The Moral and Sanitary Influence of Cheerfulness."..... 264
Mr. George Wirth's paper on "The Sanitation of the House as respects warming, lighting, ventilation and plumbing." 269
Hon. Sumner Ladd's paper on "The Reign of Law."..... 273
Sanitary Water Survey of the State..... 167
Schmidt, Dr. H.
report on small-pox, Stearns County..... 27
report of new outbreak of small-pox in Stearns County..... 49
Scoboria, Dr. C. Q.
report on small-pox in Henry and Zion townships, Stearns Co. 41
Scott County.
statistics and history of small-pox in..... 135
Secretary's Report
work of board..... 310
laws..... 310
diphtheria..... 312
small pox..... 312
library..... 313
laboratory..... 313
co-operation among State Boards of Health..... 313
Slagle Dr. A. G.
"Popular aid in the Prevention of Disease,"—a paper read at the Sanitary Conference, Minneapolis..... 210
Small pox—general report for 1881-82.....5-10
statistics of " " " 5
Dakota Co., Douglas Township.
statistics of..... 24
Dr. Conley's report of 24-25

Digitized by Google

Watonwan Co., St. James.
statistics of 25
Dr. Bacon's report of 25–26
Stearns Co.
statistics of 26
town of Richmond, report of by Dr. H. Schmidt 27–28
Spring Hill.
first notice 28
instructions to Dr. DuBois, by Dr. Hewett, Secretary State Board of Health 29
Lake Henry, Getty and Zion townships 30–31
Dr. DuBois, formal report of 31–38
abstracts of the reports of Dr. Campbell 39–40
Dr. C. Q. Scoboria, report of in Henry and Zion townships .. 41–43
Dr. W. L. Beebe's report 44–46
laws relating to small pox in 47–48
new outbreak of after Jan. 1st, 1882, and management of by Dr. H. Schmidt, health officer of town of Richmond 49–52
Houston County, townships of Hokah, LaCrescent and Union 53–56
statistics of 53
history of 57–62
Washington Co.
statistics of 63
report of Stillwater 63–64
" " Denmark 64
Olmsted Co.
statistics 65
detailed reports of at Rochester 65
Yellow Medicine Co.
statistics 66
report of at Granite Falls 67
Big Stone Co.
statistics 67
report of at Ortonville 67
Cottonwood Co.
statistics and history of at Windom 69
Renville Co.
statistics and history of at Hector 70
Blue Earth Co.
statistics of in Sterling and LeRoy townships 72
Freeborn Co.
history of at Albert Lea, by Dr. A. M. Burnham 73
Wilkin Co.
statistics of at M'Cauleyville 76
report of by Dr. F. R. Burnham 76
Southern Dakota.
report of by H. Capehart 80

Digitized by Google

McLeod Co.
statistics and history of at Rich Valley..... 82
Winona Co.
Winona..... 83
LeSueur Co.
Montgomery..... 84
statistics..... 84
Fillmore Co.
Lanesboro..... 91
statistics..... 91
Hennepin Co.
report of by Dr. J. C. Cockburn..... 94
statistics, Crystal Lake and Minneapolis..... 100
history of at Crystal Lake..... 101
" " " Bloomington..... 102
St. Louis Co.
report of at Duluth by Dr. V. Smith..... 103
Polk Co.
Poplar River..... 104
Becker Co.
statistics of at Lake Park..... 105
Report of Dr. J. H. Carson..... 109
Redwood Co.
statistics and history of at Walnut Grove..... 112-113
Isanti Co.
statistics and history of at Maple Ridge and Stanchfield...114-117
Appendix A.
correspondence of Dr. C. N. Hewitt, Secretary State Board of Health, and Dr. E. J. Brown..... 118
Small Pox
Report of Dr. E. J. Brown..... 119
Appendix B.
letter from Nels Lawson, Town Clerk of Cambridge to Sec'y.. 122
Appendix C.
Isanti Press notice..... 122
letter from Dr. N. M. Cook of Cambridge to Secretary C. N. Hewitt..... 123
letter from Dr. E. A. Umland to Secretary..... 123
plan of townships showing location of cases of Small Pox.... 124
extracts from report of Local Board of Health of Stanchfield.. 125
Chisago Co., Fish Lake.
report of outbreak by Dr. Alf. Fliesbug..... 127
Morrison Co.
statistics..... 129
Town of Culdrum..... 130
report of by Dr. W. H. Ewing..... 131
Pierz Township..... 134

Digitized by Google

Scott Co..
statistics and history of..... 135
"Results of Vaccination in Scott Co" (a paper read before the Minnesota Valley Medical Society, by James H. Dunn.)..139–145
Small Pox.
Crow Wing Co.
statistics of at Fort Ripley..... 145
Faribault Co.
statistics and history of in Emerald Township..... 146
"Experience of a Country Health Officer in dealing with an Epidemic of. Dr. James H. Dunn..... 215
History of an outbreak of in a Rural District. Dr. E. J. Brown 221
Secretary's Report on..... 312
Smith Dr. V. member State Board of Health
reports Small Pox in Duluth..... 103
reports his visits to Lake Park..... 107
Sperry, Prof. L. B. of Carleton College
"Some of the Dangers to Health, Moral and Physical, Incident to our present method of school education," a paper read at Sanitary Conference, Minneapolis..... 235
Spring Hill, Stearns Co.
history of Small Pox in..... 28
Stanchfield, Isanti Co.
statistics and history of Small Pox in..... 114
correspondence relating to Small Pox in..... 118
Sterling, Blue Earth Co.
statistics and history of Small Pox in..... 72
Stillwater
statistics and history of Small Pox in..... 63
St. James Watonwan Co.
report on Small Pox..... 25
St. Louis Co.
Small Pox in..... 103
Tilford, Dr. J. H.
report Small Pox at Windom..... 69
Trichinosis
general report on..... 14
notice of received by Secretary of Board from Dr. J. W. Anderson, of Marshall, Lyon Co..... 178
results of inquest on one of the victims of..... 178
examination of pork for Trichinæ..... 178
excerpts from Dr. Parson's report on the State Midical Society 179
report of at New Ulm, by Dr. B. Carl..... 181
Tuttle, Rev. J. H., Minneapolis
"The Moral and Sanitary Influence of Cheerfulness"—a paper read at Sanitary Conference. Minneapolis..... 264

Digitized by Google

Typhoid Fever
general report on 13
prevalence of in Minneapolis 172
report on at Minneapolis, by Dr. C. A. Salisbury 172
report on by Dr. J. C. Cockburn 175
death from, in Minneapolis, August 1881 to December 1882 ... 174
Union, Houston Co.
statistics and history of small pox in 53
Umland, Dr. E. A.
letter reporting small pox in Isanti County 124
Vaccination.
general report 11
immunity from at Spring Hill 36
instance of typical vaccination with confluent variola at Spring Hill 37
similar case at Melrose 39
method of at Zion tp 42
bovine virus unreliable 32
efficacy of 45
resistance of 46
deductions from practice of at M'Cauleyville by Dr. F. R. Burnham 78
result of in Scott Co 139
what it is and what it has accomplished in Minnesota in 1881 and 1882 by C. N. Hewitt, sec'y. of S. B. of Health 182
animal and humanized vaccine virus defined 183
Method of charging points 183
Dr. B. R. Palmer's experience in collecting humanized virus .. 184
experience of Health Officers in regard to 186
cases of vaccination and small pox working simultaneously ... 188
Van Anda, Rev. C. A. Minneapolis.
"harmony between Piety and Sanitary Laws,"— a paper read at the Sanitary Conference, Minneapolis 251
Walnut Grove.
statistics and history of small pox in 112
Watonwan County.
statistics and history of small pox in 25
Water Survey of the State 165
Washington County.
small pox in 63
White. Dr. S. C.
report of variola in vicinity of Hokah - - - - - 58
Wilkin County.
statistics and history of small pox in M'Cauleyville - - 76
Windom, Cottonwood County.
statistics and history of small pox in - - - - - 69

Digitized by Google

Winona.
small pox at Winona. - - - - - - - - - - 83
Wirth, George, Architect, St. Paul.
The Sanitation of the House as respects warming, lighting and ventilation and plumbing, a paper read at Sanitary Conference, Minneapolis. - - - - - - - - - 268
Yellow Medicine County.
statistics of history of small pox in - - - - - 66-65
Young, Dr. A. of Prescott, Wis.
calls attention of Board to a case of small pox in town of Denmark. - - - - - - - - - - - - 64
Zion, Stearns County.
history of small pox in. - - - 30

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